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SUPREME COURT OF THE UNITED STATES.

No. 140.

THE ILLINOIS CENTRAL RAILROAD COMPANY, APPELLANT,

vs.

SAMUEL H. TURRILL.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS.

FILED OCTOBER 14, 1874.

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INDEX.

	Original.	Print.
Petition to restore record	35	1
Copy of original bill	53	3
Answer	83	7
Replication	153	17
Supplemental bill, answer, and replication	157	18
Interlocutory decree	191	22
Decree upon restoration	199	23
Master's report	211	25
Exceptions to same	214	27
Order on hearing exceptions	223	30
Master's second report	227	31
Order on hearing to recommit	241	32
Order recommitting report	245	33
Master's third report	253	34
Defendant's exceptions	271	43
Complainant's exceptions	281	48
Orders on hearing exceptions	289	49
Order allowing amendment to answer	293	50
Amended answer	295	50
Decree	303	51
Bond	321	54
Certificate of evidence	310	52
Evidence of complainant	333	55
Defendant's proofs	589	197
Certificate of clerk	1976	872

33, 34 Pleas in the circuit court of the United States of America in and for the northern district of Illinois, begun and held at the city of Chicago, on Monday, the sixth day of July, A. D. one thousand eight hundred and seventy-four, before the Hon. David Davis, one of the justices of the Supreme Court of the United States, and the Hon. Thomas Drummond, circuit judge of the United States in and for the seventh judicial circuit of the United States, and on Thursday, the sixteenth day of July, one thousand eight hundred and seventy-four, and of the Independence of the United States the ninety-ninth year.

WM. H. BRADLEY, *Clerk.*

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL RAILROAD COMPANY AND John M. Douglas. } Chancery.

35, 36 Be it remembered that on the sixteenth day of December, one thousand eight hundred and seventy-one, said complainant, by his solicitors, by leave of the court first had and obtained, filed in said court his petition praying to be allowed to file a substantial copy of the original bill, the answer of the defendant, the replication thereto, and copy of the interlocutory decree, heretofore entered in said cause on the eighteenth day of July, one thousand eight hundred and seventy-one, in place and stead of the originals thereof, which were destroyed by fire on October eighth and ninth, one thousand eight hundred and seventy-one, which said petition and copies read in the words and figures following, to wit:

Circuit court of the United States in and for the northern district of Illinois.

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL RAILROAD COMPANY AND John M. Douglas. } In equity.

37, 38 To the honorable the judges of the United States circuit court for the district aforesaid:

Samuel H. Turrill, complainant in the above-entitled cause, respectfully represents that his original bill of complaint in said cause was filed in this court on the fifth day of June, A. D. 1868; that the answer of the defendants thereto was filed on the seventh day of December, A. D. 1868; and that his replication to said answer was filed on the 12th day of July, A. D. 1869. That on the ninth day of March, A. D. 1870, a supplemental bill of complaint was filed in said cause by the written consent of the solicitor of said defendants, and also the answer of the Illinois Central Railroad Company to said supplemental bill, and on the first day of July, A. D. 1870, a replication was filed to said answer.

That afterwards, to wit, on or about the fifth day of July, A. D. 1870, the said cause came on to be heard upon the pleadings, the proof
39, 40 taken therein, and the stipulations made and signed by the solicitors of the respective parties, before the honorable Thomas Drummond, judge of the circuit court of the United States in and for the seventh judicial circuit; and on the 18th day of July, A. D. 1871, the written opinion of the said judge was filed in said cause, and an inter-

locutory decree therein was entered of record, by which it was referred to Henry W. Bishop, esquire, one of the masters in chancery of this court, to take the account between the said complainant and the said defendant company prayed for in said bill of complaint, and the said cause still remains pending and undisposed of in said court.

That on the ninth day of October, A. D. 1871, a memorable fire occurred in the city of Chicago, by which the records of the said United States circuit court and all the pleadings and proofs on file in this cause, together with all the orders and other proceedings on file or entered of record therein, were, as your petitioner is informed and
41, 42 believes, entirely consumed. That such loss and destruction occurred without the fault or neglect of your petitioner; and that no certified copy of the said pleadings, proofs, and other proceedings of record in said cause is in existence or can now be procured; but that your petitioner has preserved printed copies of the original and supplemental bills, and of the answers thereto, of a stipulation made and signed by the solicitors of the respective parties, and of most of the evidence on file in said cause, and has also been able to supply accurate copies of the replications filed therein of all the additional evidence taken or read in said cause on behalf of the complainant which he deems material, of the written opinion of the said circuit judge filed in said cause, and of the interlocutory decree entered of record therein, all of which, as specified in the schedule hereto appended, are herewith filed and made a part of this application.

That the loss and destruction of the files, records, and pro-
43, 44 ceedings aforesaid will, unless supplied, result in damage to your petitioner; and your petitioner therefore prays that the copies of the pleadings, proofs, records, and other proceedings herewith filed may be substituted for those destroyed as 'foresaid, in and for such further order as may be necesasry to restore in substance the said lost files and record.

SAMUEL H. TURRILL.

UNITED STATES OF AMERICA,
Northern District of Illinois, ss:

Samuel H. Turrill, being duly sworn, deposes and says that he has heard read the foregoing petition by him subscribed, and that he knows the contents thereof, and that the same is true of his own knowledge except as to those matters which are therein stated to be on information and belief, and as to those matters he believes it to be true.

SAMUEL H. TURRILL.

Subscribed and sworn to before me this day of A. D.

45, 46 Schedule referred to in the foregoing petition:

1. Printed copy of the bill of complaint.
2. Printed copy of the answer thereto.
3. Copy of the replication to said answer.
4. Printed copy of the supplemental bill.
5. Printed copy of the answer thereto.
6. Copy of the replication to said answer.
7. Printed copy of a stipulation made and signed by the solicitors of the respective parties.
8. Printed copy of the letters-patent granted to Joseph D. Cawood, with the schedule referred to therein.

9. Printed copies of a certified record and judgment in the case of Samuel H. Turrill and Charles Wormley vs. Illinois Central Railroad Company, in the circuit court of the United States for the northern district of Illinois.

10. Printed copies of the depositions and testimony of the following witnesses, who were examined in behalf of the complainant:
47, 48 Edward S. Renwick, Hervey Waters, Eli H. Perkins, Henry Foster, Philip Hanseling, Greenough McQuestion, Isaac G. Howe, James W. Greenwood, James Connor, Meredith Pearson, Daniel Rooney, Balser Christner, Philip Christner, Peter A. Craig, Charles C. Dodge, Richard Sinclair, Jonathan Clemons, Frederick Marker, Joseph W. Smith, John McCormick, James Monk, William T. Ragland, John H. Lakey, Devillo L. Harkness, Leverett H. Clark.

49, 50 11. Copies of the depositions of the following witnesses produced on behalf of the complainant: Joshua B. Heingsworth, Maxwell Cornelius, Kinsman A. Huntoon, Alvin A. Stone, Andrew Maxwell, Peter Worrall, Richard Colford, John C. Ragland, William Sheard, Alexander Snodgrass, Jeremiah Donnelly, Matthew McMillan, Samuel Lawler, John Ginien.

12. Printed copies of the depositions and testimony of the following witnesses, who were examined on behalf of the defendant: Edward Greenleaf, William Sheard, John Cooley, Luke Pratt, Henry G.
51, 52 Wallace, William F. Dorsett, Francis C. Treadwell, jr., Henry B. Renwick, William C. Hibbard, Shaw Stewart, Michael Lawler, James Ryan, Peter Morrell, Daniel Ferrenbeck, Thomas White, James Flavan, James Box, O. A. Simons, Samuel Lawler, Henry Hooper, Frank Fitzgibbon, Isaac Hooper, Wiliam Cullen, William Benedict, Albert Congdon.

13. Printed copy of the opinion Hon. Thomas Drummond, circuit judge, filed in said cause July 18, 1871.

14. Copy of the interlocutory decree entered in said cause July 18, 1871.

53, 54 (Endorsed:) Filed Decbr. 16th, 1871. Wm. H. Bradley, clerk.

In the circuit court of the United States. In equity.

To the honorable the judges of the circuit court of the United States for the northern district of Illinois.

Samuel H. Turrill, of Chicago, in the northern district of Illinois, a citizen of the State of Illinois, brings this his bill of complaint against the Illinois Central Railroad Company, a corporation created and organized by and under the laws of the State of Illinois, and having its principal place of business at Chicago, in said State, and John M. Douglas, president of said company, and a resident of the State of Illinois.

And thereupon your orator complains and says that Joseph D. Cawood, of Marshall, in the State of Michigan, was the original
55, 56 and first inventor of a new and useful improvement in repairing railroad-bars, fully described in letters-patent hereinafter mentioned, and which had not been known or used before his said invention, and which had not been at the time of his application for a patent, as hereinafter mentioned, in public use, or on sale, with his consent or allowance, for more than two years prior to the said application.

And your orator further shows unto your honors that said Cawood, being, as aforesaid, the original and first inventor and discoverer of said

improvement, and being also a citizen of the United States, did, on the ninth day of September, 1856, upon due application therefor, obtain letters-patent of the United States for said invention and improvement, in due form of law, under the seal of the Patent-Office of the United States, bearing date the day and year last above mentioned, and signed by the Secretary of the Interior, and countersigned by the Com-
57, 58 missioner of Patents of the United States, whereby was granted to the said Cawood, his heirs, administrators, or assigns, for the term of fourteen years from the date thereof, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said machines, which is entitled in the schedule annexed to the said letters-patent "An improvement in the common anvil or swage-block for the purpose of welding up and reforming the ends of railroad-rails when they have exfoliated or become shattered by unequal wear occasioned by the inequalities of the road;" all of which will more fully appear in and by the said letters-patent, to which for greater certainty your orator craves leave to refer.

And your orator further shows unto your honors that the said Cawood exercised and enjoyed the rights secured to him by said letters-patent from the said ninth day of September, 1856, to the eleventh day
59, 60 of November, 1856, on which last-mentioned day the said Cawood did, by his deed of that date, for a valuable consideration, convey to one Francis W. Sherman one-third of his right and claim in said letters-patent.

And afterwards, to wit, on the first day June, 1857, said Cawood did, by his deed of that date, for a valuable consideration, convey to said Francis W. Sherman and one George Johnson, each, one undivided fourth, and to one Darius Clark and to one Emmons Clark, each, one undivided eighth part of the rights secured by said patent, reserving to himself one undivided fourth of his right and claim in the said letters-patent, and excepting from said conveyance the rights to make, use, and vend to others the said invention in the State of Wisconsin.

And further, on said first day of June, 1857, the said Francis W. Sherman and George Johnson did, by the joint deed of that date,
61, 62 for a valuable consideration, reconvey and re-assign to the said Cawood all their right and claim in the said letters-patent.

And afterwards, to wit, on the twenty-first day of September, 1858, said Darius Clark and Emmons Clark did, by their joint deed of that date, for a valuable consideration, convey to one David H. Williams all their right and claim in said letters-patent.

And afterwards, to wit, on the first day of March, 1859, said Francis W. Sherman did, by his deed of that date, for a valuable consideration, convey to one Benoni S. Gleason all his right and claim in said letters-patent.

And afterwards, to wit, on the tenth day of March, 1859, the said David H. Williams did, by his deed of that date, convey, for a valuable consideration, to the said Francis W. Sherman, all his right and claim in the said letters-patent.

And further, upon the said tenth day of March, 1859, the said
63, 64 Francis W. Sherman did, by his deed of that date, for a valuable consideration, convey to the said Benoni S. Gleason all his right and claim derived under the last-mentioned deed in the said letters-patent.

And afterwards, to wit, on the eleventh day of March, 1859, the said Francis W. Sherman did, by his deed of that date, for a valuable consideration, convey unto the said Benoni S. Gleason all his interest in

the said letters-patent derived by the assignment of the said David H. Williams to him, and also by the assignment to him, the said Sherman, and others above referred to, bearing date June 1st, 1857.

And afterwards, to wit, on the eighteenth day of October, 1859, the said Benoni S. Gleason, Joseph Cawood, and George Johnson did, by their joint deed of that date, for a valuable consideration, convey to William H. Dunning and Charles Wormley all their right and claim in said letters-patent.

65,66 And afterwards, to wit, on the twenty-third day of August, 1860, the said William H. Dunning and Charles Wormley did, by their joint deed of that date, for a valuable consideration, convey to your orator the fifty-five per cent., meaning thereby fifty-five one-hundredths, interest in said letters-patent, and excepting the right to make, use, and vend the said invention in the States of Wisconsin and California.

And further, on the said twenty-third day of August, 1860, the said William H. Dunning did, by his deed of that date, for a valuable consideration, convey to the said Charles Wormley all his right and claim in said letters-patent.

And afterwards, to wit, on the fourteenth day of May, 1861, the said Geo. Johnson did, by his deed of that date, for a valuable consideration, convey to your orator all his right and interest in said letters-patent.

67,68 Afterwards, to wit, on the twenty-seventh day of June, 1861, the said Joseph D. Cawood did, by his deed of that date, for a valuable consideration, convey unto the said Charles Wormley and your orator all his right and interest in the said letters-patent.

And further, on said twenty-seventh day of June, 1861, the said Charles Wormley did, by his deed of that date, for a valuable consideration, convey unto your orator the twenty-five per cent., meaning thereby twenty-five one-hundredths, interest in and to the said letters-patent, excepting for the State of California, and the whole of his, the said Wormley's, right and interest in and to the said letters-patent for the State of Wisconsin.

And afterwards, to wit, on the eighteenth day of February, 1862, the said Charles Wormley did, by his deed of that date, for a valuable consideration, convey to your orator all his right and interest whatsoever in and to the said letters-patent.

69,70 All which said deeds of assignment hereinbefore mentioned have been and are duly recorded in the Patent-Office of the United States at Washington.

And your orator avers that, by virtue of the said letters-patent and the terms of the subsequent deeds of assignment aforementioned, your orator not only became possessed of and entitled to the said letters-patent, and all the property, right, and interest in the said invention and improvement as secured thereby, but also became the assignee and equitable owner of all rights and causes of action by reason of any and all infringement of the same at any time committed.

71,72 And your orator further shows unto your honors that the said Illinois Central Railroad Company have heretofore made one hundred of the said machines, or thereabouts, and are now, and for a considerable time past have been, using twenty-eight of the said machines, or thereabouts, substantially the same in construction and mode of operation as the machine mentioned in said letters-patent, the exclusive right to make, use, and vend which is by law vested in your orator; but precisely how many of said machines the said Illinois Central Railroad Company has so made and used, and how long it has so continued

to make and use them, your orator for want of the discovery hereinafter prayed does not know and cannot therefore set forth; and thereby the said defendant has infringed and still continues to infringe upon the exclusive privileges intended to be secured by the said letters-patent, to the great injury of your orator.

And your orator further shows unto your honors that heretofore, viz, at the term of this honorable court begun and holden at Chicago, within and for the northern district of Illinois, on the third Monday in December, in the year of our Lord one thousand eight hundred & sixty-one, your orator and the said Charles Wormley impleaded the Illinois Central Railroad Company, a corporation established by law of the State of Illinois, in an action at law, wherein they declared against said
73,74 corporation in a plea of trespass on the case for a violation of the exclusive privileges then secured by virtue of said letters-patent and the assignments before mentioned to your orator and the said Charles Wormley by using machines substantially the same in construction and mode of operation as the said machine invented by the said Cawood; and thereupon, the said suit at law having been duly continued from term to term until the term begun and holden at Chicago, within and for the northern district of Illinois, on the first Monday of July, A. D. 1867, the said defendant corporation having pleaded that they were not guilty in manner and form as the said plaintiffs had declared against them, and issue being joined thereon, and the trial by jury having been waived by a written stipulation signed by the parties in due form of law, the cause was committed to the court, who found that the said defendant
75,76 corporation was guilty in manner and form as the said plaintiffs had declared against them, and assessed damages in the sum of twelve hundred and ninety-two dollars, together with the costs of the suit. And thereafter, to wit, on the eight' day of November, then next following, a judgment was duly rendered upon the said verdict; all of which will more fully appear in and by the record thereof now remaining in the said court, or by a duly-certified copy thereof, to which reference is hereby made.

And your orator avers that in and by the action at law thus tried and determined the validity of the said letters-patent was put in issue and fully tried and determined.

And your orator has requested the said Illinois Central Railroad Company to acknowledge his rights in the premises and to desist and refrain from unlawfully disregarding and infringing the same, and to account with and pay to your orator what is justly due to your or-
77, 78 ator by reason of said infringement. But now so it is, may it please your honors, that the said defendant wholly refuse' so to do, but has combined and confederated with other persons, to your orator unknown, to resist and destroy the exclusive rights and privileges secured to your orator as aforesaid, and to make and use the said improvements without the license of your orator and in violation of his just rights in the premises; all of which is contrary to equity and good conscience. To the end, therefore, that the said Illinois Central Railroad Company may, if it can, show why your orator should not have the relief herein prayed, and may, under its corporate seal, full, true, direct, and perfect answer make to all and singular the premises, and that the said John M. Douglas, president of said Illinois Central Railroad Company, may, under oath and according to the best and utmost knowledge and information he may be able, as an officer of said corporation,
79, 80 to obtain on the subject, especially answer, discover, and set forth whether, during any, and what, period of time, and where, the

said Illinois Central Railroad Company has made or used any, and how many, machines for repairing railroad-bars, and whether or not the same embraced the said improvements, or any substantial part thereof, patented to said Cawood as aforesaid, or how the same differed from said Cawood's patent, if at all; also how many railroad-bars have been repaired and welded by or for said Illinois Central Railroad Company on or with the use of the machines aforesaid during each and every year since the date of said letters-patent, to wit, the 9th day of September, 1856, and the number of feet and inches of said railroad-bars so welded and repaired as aforesaid in each and every year; also, the number of railroad "frogs" made or repaired on or with the use of the machines aforesaid, and the number of feet and inches thereof, during each of said years; and that said Illinois Central Railroad Company may an-
81, 82 swer the premises and may be decreed to account and pay to your orator all gains and profits from unlawfully making and using machines for repairing railroad-bars, embracing said improvement patented to said Cawood, and may be restrained, together with its servants and agents, by an injunction to be issued out of this honorable court or by one of your honors, according to law in such cases provided, from making or using any machines for repairing railroad-bars embracing said improvement, or any substantial part thereof; and for such other and further relief in the premises as the nature of the case may require and to your honors shall seem meet.

May it please your honors to grant unto your orator not only writs of injunction conformable to the prayer of this bill, but also a writ of subpœna, to be directed to the said Illinois Central Railroad Company and John M. Douglas, its president, commanding them, at a certain
83, 84 time and under a certain penalty, therein to be limited, personally to be and appear before your honors in this honorable court, then and there to answer unto this bill of complaint, and to do and receive what to your honors shall deem meet in the premises.

(Signed) SAMUEL H. TURRILL.
BECKWITH, AYER & KALES,
Solicitors and of Counsel for Complainant.

(Endorsed:) Filed Dec'b'r 16th, 1871. Wm. H. Bradley, clerk.

In the circuit court of the United States for the northern district of Illinois.

SAMUEL H. TURRILL
v.
THE ILLINOIS CENTRAL RAILROAD COMPANY and John M. Douglas. } In chancery.

These defendants, now and at all times hereafter saving and reserving unto themselves any and all means of benefit and advantage
85, 86 of exception which can or may be taken to the many errors, uncertainties, and imperfections of said complainant's said bill of complaint, for answer thereto, or so much and such parts thereof as these defendants are advised it is material or necessary for them to make answer to, say that they are informed and believe, and, upon such information and belief, allege it to be true, that the said Joseph D. Cawood in the said bill mentioned was not the original and first inventor of a new and useful improvement in repairing railroad-bars, nor was he the original and first inventor of the special device, contrivance, or mechan-

ism described in and intended to be covered by the letters-patent in said bill referred to; but, on the contrary thereof, these defendants, upon information and belief as aforesaid, expressly deny that said device, contrivance, or mechanism, or any substantial or material part thereof, was new at the time of the pretended invention thereof by said Cawood.

And these defendants, further answering, upon information and
87, 88 belief, admit that the said Joseph D. Cawood, although not the original and first inventor of said alleged improvement, but falsely and fraudulently claiming to be such, and being, or claiming to be, a citizen of the United States, did, on or about the 9th day of September, A. D. 1856, upon an application by him previously made to the Commissioner of Patents of the United States therefor, obtain letters-patent of the United States for said pretended invention and improvement; that said letters-patent were in due form, under the seal of the Patent-Office of the United States, signed by the Secretary of the Interior and countersigned by the Commissioner of Patents, and bearing date the day and year aforesaid, whereby it was attempted to grant and secure unto the said Joseph D. Cawood, his heirs, administrators, and assigns, for the term of fourteen years from the date thereof, the full and exclusive right and liberty of making, constructing, using, and vending to others
to be used, the said machine or pretended improvement in the
89, 80 said letters-patent, and the schedule thereto attached, described, and that the said machine is entitled in said schedule "An improvement in the common anvil or swage-block, for the purpose of welding up and re-forming the ends of railroad-rails when they have exfoliated or become shattered by unequal wear, occasioned by the inequalities of the road."

And these defendants, further answering, say that they have no knowledge and are not informed, except by the statements of said bill, nor have they any belief, nor in their possession or control any means of belief, as to what conveyances or assignments of the said letters patent, or of the rights pretended to have been secured to said Cawood thereby, have been made; and therefore, neither admitting or denying the statements of said bill in that behalf, they leave the said complainant to make proof thereof as he may be advised is proper. But these
defendants admit that if the several conveyances and assign-
91, 92 ments mentioned in said bill have been in fact executed and delivered, as in said bill is alleged, the said complainant has acquired the interest granted by the said letters-patent, or such portions thereof as were from time to time conveyed to him thereby; such interest, however, being only in the unexpired term of said letters-patent, dating from the time of the execution and delivery of the said conveyances to him respectively. And these defendants deny, upon information and belief, that such conveyances, if made, give the complainant any right, either in law or equity, to damages for the infringement of said letters-patent, or compensation for the use of said pretended invention, even if the same were valid prior to the dates of the several conveyances to him.

And these defendants, further answering, upon information and belief expressly deny that the said device, contrivance, or mechanism described
in the said letters-patent and schedule thereto attached, so
93, 94 issued to the said Joseph D. Cawood as aforesaid, or any material or substantial part thereof, was new or that the same had not been known and used at and prior to the time of the alleged invention thereof by the said Cawood; on the contrary thereof these defend-

ants, upon like information and belief, insist and state the fact to be that the same and the material and substantial parts thereof were well known and publicly used long prior to the pretended invention thereof by the said Cawood; that the said device, contrivance, and mechanism, and the material and substantial parts thereof, were known and in general and public use in the United States armory at Springfield, in the State of Massachusetts, long prior to the alleged invention of said Cawood; and that the same was so known and used at said armory by Selah Chandler, late of said Springfield, now deceased, and by John Cooley,
Luke Pratt, W. F. Dorsett, and H. D. Wallace, or some of them,
95, 96 in the process of forging and welding the sockets of bayonets as early as, and, as these defendants are advised and believe, prior to, the year one thousand eight hundred and forty-five.

And these defendants, further answering, say they are informed and believe, and upon information and belief they allege it to be true, that the said device, contrivance or mechanism, and pretended invention of said Joseph D. Cawood, and the material and substantial parts thereof, were well known to and publicly used by Edward Greenleaf, formerly of Cincinnati, in the State of Ohio, now of Indianapolis, in the State of Indiana, and others, in the foundry and machine-shop of one Anthony Harkness, at Cincinnati aforesaid, being prior to the alleged invention thereof by the said Cawood; and that the same was so known to and used by the said Edward Greenleaf and others as early as the year 1849, in the shops and at the place aforesaid, in the making and forging of angle-iron for the frames of locomotive engines.

97, 98 And these defendants, further answering, say that they are advised and believe, and therefore charge it to be true, that the several mechanics, devices, and contrivances so well known and publicly used, as aforesaid, in the United States armory at Springfield, Massachusetts, and in the foundry and machine-shops of Anthony Harkness, at Cincinnati, in the State of Ohio, were and each of them was the same in principle and mode of operation as the device, contrivance, or mechanism described in and sought to be covered by the said letters-patent referred to in the complainant's said bill of complaint.

And these defendants, further answering, expressly state and show that the said pretended invention of the said Joseph D. Cawood was not and is not, nor does the same in any way relate to, an improvement in the manner of mending or repairing railroad-bars; but that said pretended invention consists solely of a machine or contrivance for holding, supporting, and preserving the form of the lower part of the railroad-bar, whilst the repairing, or forging, in the usual way is per-
99, 100 formed on the upper part or table of the bar; and that all the elements constituting the said machine or contrivance, in substantially the same combination and operating in substantially the same way for the accomplishment of the same and similar purposes, existed and were in use as aforesaid in the machines employed as aforesaid in the forging and welding of bayonet-sockets, and in the machine for welding angle-iron, the only difference being in the forms of the sides of the jaws, clamp, or press-blocks, between which the article or substance to be wrought upon was held; the said jaws, clamp, or press-blocks, in each case, being made to fit or conform to the sides or surfaces of the article or substance intended to be held between them, whilst the operation of welding, forming, and repairing was performed upon it.

And these defendants, further answering, insist, and upon information and belief state it to be true, that machines and mechanical

101, 102 contrivances in various forms and of various sizes, and embodying substantially the same elements and combinations, and embracing and possessing substantially the same construction, principle, and mode of operation, as the said machine so patented to the said Joseph D. Cawood, as aforesaid, were generally and commonly in use in the machine-shops throughout the country for the same or substatially the same purpose, long prior to the time of the alleged invention of the said Cawood; but admitting that they had not before or until about that time been applied to the special purpose of holding and preserving the form of railroad-bars whilst the operation of forging, welding, or mending was performed upon said bars, these defendants say that the occasion for such use had not arisen in this country till about that time; that railroads, and the use of railroad-bars, especially of the form referred to in the specifications attached to said Cawood's patent, were then of recent introduction, and very little of the iron or rails originally laid down in the construction of railroads had become so much worn as to need repairs or mending. And the defendants further state that as the occasion or necessity for repairing said bars arose, the mechanics having said repairs in charge, generally, and without consultation and without reference to or knowledge of the pretended invention of the said Cawood, remodeled the machines previously in use by them, and adapted them to the special purpose of holding and preserving the form and proportion of the bar whilst the forging and welding necessary on repairing it was going on; and, in some instances, the machines so produced were like, and in others unlike, in form and appearance, the machine patented to the said Cawood; but all were designed for and in a greater or less degree accomplished the same result.

And these defendants claim and insist that all of said ma-
105, 106 chines and contrivances, including that described in said Cawood's patent, were in substance and effect only an adaptation of previously-existing machines, instruments, or tools to the special purpose of holding a railroad-bar, and they did not, nor did any or either of them, contrive anything new in principle, construction, or mode of operation.

And these defendants, further answering upon information and belief, say that even if the said device, contrivance, or mechanism described in the said letters-patent so issued to the said Joseph D. Cawood, as aforesaid, was new, and had not been known or used prior to the time when the said Cawood claimed to have invented the same, still they deny that the said Joseph D. Cawood was the original and first inventor of the same, or of any material or substantial part thereof; and upon like information and belief they state the facts respecting the said pretended invention of the said Cawood to be as follows, to wit:

That during the years 1852 and 1853, or some portions thereof, the said
Joseph D. Cawood was master-mechanic or superintendent of
107, 108 the shops of the Michigan Central Railroad Company at Marshall, in the State of Michigan, and whilst employed in that capacity one James McClellan was the foreman in the blacksmith-shops of said company, and at the same place, under the supervision and control of said Cawood; that early in the year 1853 some railroad-bars were brought into said blacksmith-shops for repairs, the same having been broken down, bruised, or exfoliated by wear upon the road of said company; and said McClellan, as foreman of said shops, was requested to repair or mend the same; that said McClellan proceeded to mend said bars upon the common anvil or swage block in use in said shops, and finding some difficulty, principally owing, as defendants insist, to in-

experience in that particular branch of blacksmithing, in preserving the back or web of the rail or bar whilst forging or welding a piece of iron upon the upper table of the bar, he set about constructing an anvil-block with a fixed and moveable jaw, between which to hold
109, 110 bars of iron during the process of reparation; that said McClellan thereupon prepared rough drafts or sketches and models of such machine, which were by him exhibited to various persons at Marshall aforesaid; and also submitted the same, with the full explanations of the said machine, its construction and mode of operation, to said Cawood, as master-mechanic or superintendent as aforesaid, for his approval, and for the purpose of obtaining from him the necessary permission or authority for its construction; that said drawings and sketches and models, so exhibited to said Cawood, represented substantially, and in all material particulars, the device, contrivance, or mechanism described in the said letters-patent of the said Cawood; and after particular explanations of the same and its mode of operation by the said McClellan, the said Cawood authorized the construction of a machine according to the plan of said McClellan, and the same was thereupon, and under the special superintendence of said Mc-
111, 112 Clellan, built and put in operation in the shops of said railroad company at Marshall aforesaid, and was used by the said McClellan and others in said shops in repairing railroad-bars; and immediately thereafter, and whilst the said McClellan was using due diligence in perfecting said machine, the said Cawood, falsely pretending that the said machine had been invented by him, made application to the Commissioner of Patents of the United States for letters-patent therefor to be issued to him, and upon the said application and the false and fraudulent representations therein contained the said letters-patent referred to in the said bill of complaint were granted and issued to the said Cawood; and so these defendants, upon information and belief as aforesaid, say and insist that if the said device, contrivance, or mechanism was new at the time of the application of the said Cawood for said letters-patent, the said Cawood surreptitiously and unjustly obtained a patent for that which was in fact the invention of another, to wit, the said James McClellan, who was using reasonable
113, 114 diligence in adapting and perfecting the same, and who did, in fact, subsequently and after the said machine had been sufficiently tested, and, as defendants are advised, in the spring of the year 1853, apply to the Commissioner of Patents of the United States for letters-patent therefor to be issued to him; and these defendants, upon like information and belief, charge and insist that the said machine so constructed and put in use by and under the direction of the said James McClellan, as aforesaid, at Marshall, in the State of Michigan aforesaid, was the same in construction, principle, and mode of operation as that described in the letters-patent of the said Joseph D. Cawood, referred to in said bill of complaint and the schedule thereto attached.

And these defendants, further answering upon information and belief, say that the said device, contrivance, or mechanism so patented to the said Joseph D. Cawood was not, nor was any material or substantial part thereof, new at the time of the alleged invention thereof by the said Cawood, but that the same was long prior
115, 116 thereto the subject-matter of and fully described and made known in the following-named letters-patent, that is to say:

Letters-patent of the United States issued on the 31st day of December, A. D. 1845, to Samuel G. Reynolds, of Bristol, Rhode Island, for a machine for heading and pointing pins;

Letters-patent of the United States issued September 3d, 1846, to Thomas W. Harvey, of New York City, in the State of New York, for a machine for heading screw-blanks;

Letters-patent of the United States issued May 8th, 1849, to David S. Weatherhead, of Providence, Rhode Island, for an improved method of constructing and operating the heads in bolt-machines;

Letters-patent of the United States issued June 18th, 1850, to Ammi M. George, of Nashua, in the State of New Hampshire, for a spike-machine;

Letters-patent of the United States issued June 16th, 1850, to More Hardway, of Troy, New York, for a spike-machine;

Letters-patent of the United States issued July 30th, 1850,
117, 118 to William E. Chester, of Port Chester, in the State of New York, for an improved bolt and rivet machine;

Letters-patent of the United States issued August 20th, 1850, John Van Brocklin, of Middleport, New York, for an improvement in machinery for heading bolts, rivets, &c.;

Letters-patent of the United States issued December 25th, 1851, to Nathan Storks, of Albany, New York, for an improvement in bolt-heading machines;

Letters-patent of the United States issued September 14th, 1852, to G. N. Richards, assigned to C. N. Plimpton, for an improvement in forging-machines; and in

Letters-patent granted in England, in the year 1846, to Wm. Church for a machine for stamping, flattening, and shaping metals, No. 11197, and especially at figures 12, 13, 22, 28, 29, 30, 31, 32, 33, and 34 of the drawings annexed thereto, and the text of the specifications descriptive of said figures.

And these defendants, upon information and belief as aforesaid, insist and claim that the said device, contrivance, or mech-
119, 120 anism so patented to the said Cawood as aforesaid, and the substantial and material parts thereof, were described in and publicly made known by the said several letters-patent aforesaid, and each of them, long prior to the time when the said Cawood is alleged to have invented the same.

And these defendants, further answering upon information and belief, say that the said device, contrivance, and mechanism so patented to the said Cawood, and the substantial and material parts thereof, were, prior to the supposed invention thereof by said Cawood, described and publicly made known in the following works, that is to say:

The transactions of the society instituted at London for the encouragement of arts, manufactures, and commerce, volume 48, printed in London, England, in the year 1831, particularly in the articles commencing at page 250 and extending through pages 259, 260, and 261 of said work. Technological Encycloæpdia, by Isham Joseph Prechtt, volume 2 of plates, plates 336, 337, 338, and pages 104 to 131, both inclusive, published at Stuttgard, in the year 1846, in the
121, 122 German language. Volume 2 of Holtzoppel's Turning and Mechanical Manipulations, published in London, England, in the year 1847, and especially at pages 858, 859, and 860 of said work. Cyclopædia or Universal Dictionary of Arts, Sciences, and Literature, by Abraham Rees, DD., F. R. S., first American edition, article "forging." Volume 1 of the Treatise on the Progression, Improvement, and Present State of the Manufacture of Metals, title "iron and steel," printed in London, England, for Longman, Brown, Green & Longman,

Paternoster Row, and John Taylor, Upper Grover street, in the year 1847, at page 215, figure 72. The Practical Metal-Worker's Assistant, by Oliver Byrne, published in Philadelphia, Penn., by Henry Cary Baird, in the year 1851, and particularly at page 25, figure 8; page 26, figures 9, 10, 11, and 12; page 35, figures 16 and 17; pages 60 and 61; figure 67 of said work. In all and each of which said public works, as these defendants are informed, the said device, contrivance, or mechanism, and the substantial and material parts
122, 123 thereof, were set forth and described.

And these defendants, further answering, admit that this defendant, The Illinois Central Railroad Company, is now, and was at, the time of the filing of said bill of complaint, using in its shop, as they may be required in repairing rails or bars, twenty-one (21) machines, which the said complainant claims to be similar in constructive principle and mode of operation to the machine described in the letters-patent of the said Cawood; but whether said machines so in use by the said Illinois Central Railroad Company, or any or either of them, are substantially the same in principle and mode of operation as the said Cawood machine, this defendant' do not assume to decide, and insist that the said complainant make proof of his allegations and claims in that behalf as he may be advised is proper.

And these defendants, further answering, admit that this defendant, The Illinois Central Railroad Company, was impleaded in this
125, 126 court by the said complainant and one Charles Wormley in an action of trespass on the case for a violation of the pretended exclusive privileges granted to the said Joseph D. Cawood by the letters-patent aforesaid, then claimed to be owned and held by the said complainant and said Wormley as assignees of said Cawood substantially at the time and in the manner stated in said bill of complaint, and that a trial of said cause was had at a term of this court begun and held at Chicago on the first Monday of October, A. D. 1870, instead of the first Monday of July, A. D. 1867, as alleged in said bill, and that said trial was by written stipulation before the judges of this court, a jury having been waived; and that on the 8th day of November, A. D. 1867, and during the said term of this court, the court found the said defendant gulity in manner and form as the said plaintiffs had declared against it, and assessed damages against it in the sum of twelve hundred and ninety-two dollars, for which amount, together with costs of suit, judg-
127, 128 ment was on the day last aforesaid rendered against the said defendant. And this defendant, The Illinois Central Railroad Company, thereupon alleging and presenting its exceptions to the rulings, opinions, and judgment of the court, which were duly certified by the court and embodied in a bill of exceptions filed in said cause, and having given bonds with security as required by law and the orders of the court, removed the said cause by writ of error into the supreme court of the United States at Washington, District of Columbia, where the same is now pending and undetermined, upon the exceptions and errors so as aforesaid alleged therein.

And these defendants, further answering, admit that for the purposes of said suit, but for no other purpose, it was conceded upon the trial of said cause by the said defendant that the machine in use by it at the time of the commencement of said proceedings and during the time covered by the claims of the said plaintiffs therein were the same in principle and mode of operation as the machine of said Cawood described in the letters-patent aforesaid issued to him.

129, 130 And these defendants, further answering, state the fact to be

that the only issues made and tried, and the only ones submitted to and heard and determined, by said court in said cause, were whether or not the said bayonet-machines so in use as aforesaid at the United States Armory in Springfield, Massachusetts, aforesaid; and the machine of Edward Greenleaf for making angle-iron, in use as aforesaid at Cincinnati, in the State of Ohio; and the machine described in the letters-patent issued in England in the year 1846 to William Church, as is hereinbefore stated, were substantially the same in principle and mode of operation as the Cawood machine, and that upon these issues, and none others, the said cause was tried and determined by this court.

And the defendants insist that they are not, nor is the said defendant, The Illinois Central Railroad Company, bound or concluded in this case by the finding and judgment in said cause, even if the same shall be affirmed in the said Supreme Court, from setting up and insisting
131, 132 upon the same defenses, or from asserting other and different or further defenses to the claims of the said complainant, and that these defendants ought not to be prejudiced in their defense in this cause by the finding and judgment aforesaid.

And these defendants further state that they are advised by counsel, and verily believe, that the rulings, opinions, and judgment of the court in said cause were erroneous, and that the same should be reversed in and by the said Supreme Court.

And these defendants therefore deny that the validity of said letters-patent, issued as aforesaid to said Joseph D. Cawood, was fully tried and determined in and by the action of law aforesaid.

And these defendants, further answering, say that about the year 1853, one Baird, a machinist in the employ of this defendant, The Illinois Central Railroad Company, designed and caused to be constructed a machine for the purpose of holding, supporting, and preserving the form
133, 134 of railroad bars during the operation of forging or welding thereon, consisting of an anvil-block of cast-iron, upon which was cast a raised block with one of its sides or edges made to conform to the side of the rail, and a moveable block with its sides or edge fitted to the opposite side of the rail, and so arranged as to be moved back and forth upon the anvil-block by means of a lever, and said machine so constructed was occasionally used for holding rails whilst being mended until the year 1857, when another similar machine was constructed, and the two, and no more, were occasionally used for the same purpose until the year 1860. That said two machines were used in the shops of said company in the city of Chicago; but how many bars were mended or how many frogs made thereon these defendants are unable to state, for the reason that no record of the amount of mending done upon rails by said company or of the work performed on said machines was kept prior to the year 1860. These defendants, however, state that the amount of such work prior to the year 1860 was and must have been
135, 136 very small, because the iron upon the road of said company, then new, having been used but a few years, was originally of good quality, and had not to any considerable extent become worn or broken down.

And these defendants, further answering, state that in the year 1860 another and similar machine was put up in the shops of said company at La Salle, Illinois, and in the year 1861 four additional machines of the same kind and description were put up in the shops of said company, one at each of the following-named places, to wit: Du Quoin, Nora, Galena, and Champaign; and in the year 1863 another of said machines was put in the shops of said company at Champaign. That in the year 1865

three of said machines were put up in the shops of said company at the following places, to wit: one at Chicago, one at El Paso, and one at Forreston.

And in the year 1866, one additional machine was put up in said company's shops at Champaign. That during the year 1867 three
137, 138 additional machines, for the purpose aforesaid, were put up by said company in its shops as follows: One at La Salle, one at Vandalia, and one at Decatur; and during the present year, 1868, said company has in its shops for use, as occasion may require, machines for the purpose aforesaid as follows: Two (2) at Chicago, two (2) at La Salle, two (2) at Duquoin, one (1) at Nora, one (1) at Galena, two (2) at Champaign, one (1) at El Paso, one (1) at Forreston, two (2) at Decatur, two (2) at Vandalia, one (1) at Centralia, two (2) at Jonesboro', and two (2) at Dubuque, in the State of Iowa, making in all twenty-one (21) machines which said company has in use or ready for use for mending rails or making frogs, all except two (2) of the same general form and construction as that originally designed and put up by said Baird; and in respect to said two (2) machines, these defendants say that one of them consists of two moveable jaws of ridge-like form with the cross-section of a railroad bar indented into their opposite sides and fitting into a V form open-
139, 140 ing in an iron block or anvil, the said jaws being thrown out of said opening by a lever and pulling apart for the reception of the bar or rail and returning into place by their own weight, and enclosing the lower portion and web of the rail and a portion of the upper table between the undivided portions thereof the said machine being known as the Smith & Beebe machine. The other said machines, built and put in operation in or about the year 1866, is, as these defendants insist, only an enlargement of the machines in use at the United States armory in Springfield, Massachusetts, for facilitating the forging and welding of the sockets of bayonets, as hereinbefore described, the only real difference, except in size, being in substituting dies or jaws conforming to the sides of railroad bars in place of dies or jaws fitting the lower portion and sides of the bayonet-sockets, which, as these defendants are advised, and believe to be true, is a change of form merely, in no way affecting the principle or mode of operation of the machine. And these defendants therefore insist that if the said machine so constructed
141, 142 is or shall be adjudged to be similar in principle or in mode of operation to the machine described in said Cawood's patent, then the said bayonet-machine so used at Springfield, in the State of Massachusetts, as aforesaid, is the same in principle and mode of operation as the said Cawood machine, and the letters-patent of the said Cawood are and must be held to be null and void.

And the defendants, further answering, say that they have no means of stating how many rails were repaired or how many frogs were made upon the machines aforesaid in the shops of this defendant, The Illinois Central Railroad Company, prior to the year 1860, for the reason that no record of such work was kept prior to said year, nor have they any record of the frogs made in said shops prior to the year 1861. And these defendants further state the amount of work, as near as they have been able to ascertain the same, done on said machines in the shops of the Illinois Central Railroad, commencing with the year 1860 and
143, 144 ending in August, A. D. 1868, is shown in and by the following tabular statement, to wit:

Year.	No. of bars mended.	No. of inches mended.	Total cost.	Cost per bar.	Average weld per bar.	No. of frogs made.
1860	252	3,780	$356 05	$1 41	15 in.	.....
1861	9,237	152,930	5,936 05	64	16 "	97
1862	10,906	196,042	7,124 74	65.3	18 "	122
1863	12,851	249,627	11,538 53	89.8	19.4 "	169
1864	12,352	240,663	14,620 67	1 18	19.5 "	243
1865	16,555	320,782	17,775 84	1 07	19.4 "	188
1866	31,535	503,746	25,970 45	82.4	15.8 "	189
1867	38,457	542,255	28,353 28	73.7	14.1 "	265
1868	25,347	356,393	17,434 84	68.8	14.1 "	233

From which statement it appears that during the time mentioned there were mended upon the machines so put up as aforesaid in the shops of this defendant, The Illinois Central Railroad Company, one hundred and fifty-seven thousand four hundred and ninety-two, (157,492;) that the average weld per bar was sixteen and three-tenths (16.3) inches, making the whole number of inches of actual mending two mil'ion five hundred and sixty-six thousand two hundred and seventeen,
145, 146 (2,566,217,) at an average cost of eighty-two cents per bar, or little more than five cents per inch, and at an aggregate cost of one hundred and twenty-nine thousand one hundred and thirteen dollars and forty-five cents, ($129,113.45,) and that during the same time there were made in the same shops one thousand five hundred and sixteen (1,516) frogs.

And these defendants, further answering, admit that the said machines so in use in the shops of this defendant, The Illinois Central Railroad Company, are a convenience in the said business of mending rails and making frogs, especially in the mending of rails adapted to the fish coupling or chair; but they deny that the same or any other similar machine is necessary in said work, and they allege and state the fact to be that rails can be mended and frogs made without the use of said machines, and upon the common swage-block with grooves fitting the sides of the rails, and that very little difficulty is experienced in so
147, 148 doing after the workmen have become accustomed to mending rails in that way; and, as these defendants are informed and believe, the work is accomplished in that way as satisfactorily and without any additional expense.

That some railroad companies, although mending large numbers of rails, have rejected machines of various forms, and amongst others the machine described in the patent of the said Cawood, after thorough test thereof, and have ever since mended their rails upon common swage or block, claiming that rails are mended better, and at less cost, in that way than upon machines with jaws. These defendants therefore deny that upon information and belief that the defendant, The Illinois Central Railroad Company, has received any considerable amount of benefit from the use of said machines so put up and used in its shops as aforesaid, or that the same are in any sense indispensable to the successful prosecution of the business of mending rails in the shops of
149, 150 said company.

And these defendants, further answering, deny all and all manner of unlawful combination and confederacy wherewith they are

charged in and by the said bill of complaint, without this, that any cause, matter, or thing in said bill contained, and not herein and hereby well and sufficiently answered, confessed, and avoided, traversed or denied, is true to the knowledge or belief of these defendants; all of which several matters and things these defendants are ready and willing to aver, maintain, and prove, as this honorable court shall direct, and they humbly pray to be hence dismissed with their reasonable costs and charges by them in this behalf most wrongfully sustained.

THE ILLINOIS CENTRAL RAILROAD COMPANY,
By J. M. DOUGLAS, *President.*
JOHN M. DOUGLAS.

JOHN N. JEWETT, *Solicitor for Defendants.*

STATE OF ILLINOIS,
County of Cook, City of Chicago, ss:

151, 152 John M. Douglas, being first duly sworn, deposes and says that he is one of the defendants named in the foregoing answer in chancery, and that he is the president of the Illinois Central Railroad Company, the other defendant named therein. That said answer has been read to him, and he knows the contents thereof, and that the matters and things therein stated as of the knowledge of the said defendants are true, and as to those things stated upon information and belief he believes them to be true.

JOHN M. DOUGLAS.

Subscribed and sworn to before me, a notary public in and for the city of Chicago, in said county, this 7th day of October, 1868.
[SEAL.] PETER DAGGY.

(Endorsed:) Filed Decbr. 16th, 1871. Wm. H. Bradley, clerk.

153, 154 UNITED STATES OF AMERICA,
Northern District of Illinois, ss:

In the United States circuit court in and for said district.

SAMUEL H. TURRILL
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY & John M. Douglas. } In equity.

The replication of Samuel H. Turrill, complainant, to the answer of The Illinois Central Railroad Company and John M. Douglas, defendants.

This repliant, saving and reserving unto himself all and all manner of advantage of exception to the manifold insufficiencies of the said answer, for replication thereunto saith that he will aver and prove his said bill to be true, certain, and sufficient in the law to be answered
155, 156 unto, and that the said answer of the said defendants is uncertain, untrue, and insufficient to be replied unto by this repliant, without this, that any other matter or thing whatsoever in the said answer contained material or effectual in the law to be replied unto, confessed, and avoided, traversed or denied, is true; all which matters and things this repliant is and will be ready to aver and prove as this honorable court shall direct, and humbly prays as in and by his said bill he hath already prayed.

SAMUEL H. TURRILL,
By his solicitors, BECKWITH, AYER & KALES.

(Endorsed:) Filed Decbr. 16, 1871. Wm. H. Bradley, clerk.

In the circuit court of the United States for the northern district of Illinois, in chancery.

To the honorable judges of the circuit court of the United
157, 158 States for the northern district of Illinois:

Samuel H. Turrill, of Chicago, in the northern district of Illinois, a citizen of the State of Illinois, by leave of the court, etc., brings this his supplemental bill of complaint against the Illinois Central Railroad Company, a corporation created and organized by and under the laws of the State of Illinois, and having its principal place of business at Chicago, in said State.

And thereupon your orator complains and says that heretofore, to wit, on the 5th day of June, A. D. 1868, your orator exhibited and filed his original bill of complaint herein against the said Illinois Central Railroad Company, wherein it was and is, amongst other things, alleged and stated that at a term of this honorable court begun and holden at Chicago, within and for said northern district of Illinois, on the third Monday of December, A. D. 1861, your orator and one Charles Wormley impleaded the said Illinois Central Railroad Company in an action
159, 160 at law of a plea of trespass on the case for a violation of the exclusive privileges there secured by virtue of the said letters-patent and assignment thereof in said original bill stated to your orator and said Wormley, by using substantially the same construction and mode of operation as the said machine invented by the said Cawood; and that afterwards, to wit, on the first Monday of July, A. D. 1867, said defendant corporation having pleaded that they were not guilty in manner and form, etc., and issue being joined thereon, a trial of said cause was had, and verdict in damages returned in said court in favor of your orator, and that afterwards, to wit, on the 8th day of November, A. D. 1867, at a term of said court then holden, judgment was duly entered by said court on said verdict in favor of your orator.

That afterwards, to wit, on the 7th day of December, A. D. 1868, the said Illinois Central Railroad Company filed its answer to said original bill, and amongst other things therein and thereby alleged
161, 162 in reference to said recovery in said suit at law, that after the rendition of said judgment as aforesaid, to wit, on said 8th day of November, 1867, it sued out its writ of error and gave security according to law, and then and there removed the said cause into the Supreme Court of the United States, and that at the time of the filing of said answer said cause was pending and undetermined in said Supreme Court upon the errors and exceptions alleged therein.

And your orator now sheweth unto your honors, by way of supplement, that afterwards, to wit, at a term of the said Supreme Court of the United States begun and holden at the city of Washington, that is to say, at the December term A. D. 1868 of said court, the said cause so then and there by virtue of said writ of error pending in said court came on to be heard before said court on the transcript of the record tried therein, and on the stipulation of the counsel of the said
163, 164 Illinois Central Railroad Company, the plaintiffs in error therein, and it was then and there ordered and adjudged by said court that said writ of error be, and the same was thereby, then and there dismissed with costs, and that your orator and said Wormley recover against the said Illinois Central Railroad Company for their costs therein expended, and that they have execution therefor; and thereupon this honorable court was by the said Supreme Court then and there directed and commanded that execution and proceedings be had in this

honorable court in said cause as according to right and justice and the laws of the United States ought to be had, the said writ of error to the contrary notwithstanding.

That afterwards, to wit, on the 11th day of December, A. D. 1869, being one of the days of a term of this court then held, etc., the said mandate and order of the said Supreme Court of the United States was exhibited to and filed in this honorable court in said cause; thereupon such
165, 166 proceedings were had therein that this court then and there ordered and directed that your orator and said Wormley have execution upon their said judgment recovered in this court on said 8th day of November, 1867; and that they have and recover their costs and charges in that behalf, together with the costs in the said Supreme Court, and that they have execution therefor, as by the record will more fully appear.

That afterwards, to wit, on the 13th day of December, 1869, being in term, &c., agreeably to the order in that behalf aforesaid, execution was duly issued on said judgment in favor of your orator and said Wormley, and against said defendant, out of and under the seal of said court, directed to the marshal of said northern district of Illinois, commanding him to make the amount of said judgment and costs out of the certain property of said Illinois Central Railroad, in due form of law. And afterward, to wit, on the day of December,
167, 168 A. D. 1869, said writ was by said marshal duly returned into this honorable court, executed, and the money made thereon as thereby commanded, as by the record and proceedings in said cause will more fully appear; and thereupon your orator doth and will insist upon the said judgment and the force and effect thereof as fully as if the said writ of error had not been sued out or the said cause removed to the said Supreme Court of the United States, as alleged by the said defendant in its said answer filed herein as aforesaid.

To the end, therefore, that the said Illinois Central Railroad Company may answer the matters hereinbefore charged by way of supplement, and that your orator may have the same relief against said railroad company, defendant, as by the said original bill prayed against the said defendant, may it please your honors to direct the said defendant to demur, plead, or answer the matter of supplement aforesaid by a certain day to be fixed by this honorable court, agreeably
169, 170 to the practice thereof, etc.

BECKWITH, AYER & KALES,
Solrs., etc., of Counsel for said Complainant.

I consent to the filing of this supplemental bill, and agree that a rule to answer in twenty days may be entered.

J. N. JEWETT,
Solr. for Defts.

In the circuit court of the United States for the northern district of Illinois.

SAMUEL H. TURRILL
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY. } In chancery.

The answer of the defendant to the supplemental bill of complaint of the said Samuel H. Turrill, complainant.

This defendant, now and at all times hereafter saving and reserving unto itself all and all manner of benefit and advantage of ex-

171, 172 ception which can or may be taken to the many errors and imperfections of the said complainant's supplemental bill of complaint, for answer thereto, or unto so much and such parts thereof as this defendant is advised it is material or necessary for it to make answer unto, answering, admits that, on or about the 5th day of June, A. D. 1868, the said complainant exhibited and filed in this court his original bill of complaint against this defendant and one John M. Douglas, wherein it was, in substance and amongst other things, alleged that at a term of this honorable court begun and holden at Chicago, within and for the said northern district of Illinois, on the third Monday of December, A. D. 1861, the said complainant and one Charles Wormley impleaded this defendant in an action at law of a plea of trespass on the case for an alleged violation of the exclusive privileges claimed to have been secured by the letters-patent set forth in said original bill, and the assignment thereof to the said complainant and the said
173, 174 Wormley; and that afterwards, issue having been joined in said action, a trial was had therein, resulting in a finding of said issues against this defendant and an award of damages in favor of the said plaintiffs, upon which, on or about the 8th day of November, A. D. 1867, a judgment was rendered by this court.

And this defendant, further answering, admits that afterwards, and on or about the 7th day of December, A. D. 1868, this defendant and the said John M. Douglas filed in this honorable court their joint and several answers to said original bill, alleging in substance, and amongst other things, the removal of said cause, by writ of error, into the Supreme Court of the United States, and that the said cause was then pending and undetermined in the said Supreme Court upon the errors and exceptions alleged therein.

And this defendant, further answering the matters of supplement set forth in the said supplemental bill, admits and states that after-
175, 176 wards, and at the term of said Supreme Court begun and holden at Washington, to wit, at the December term, A. D. 1868, of said court, the said cause so pending in said court upon and by virtue of the writ of error aforesaid was, upon the motion of this defendant made therein, withdrawn from said court, and the said writ of error dismissed with costs against this defendant; but this defendant expressly denies that the said cause was heard or determined by said court upon the errors of any or either of them therein assigned. This defendant, however, admits that, upon the dismissal of said writ of error, it was then and there adjudged, in and by the said Supreme Court, that the said complainant and said Wormley recover of this defendant their costs therein expended, and that they have execution therefor, and that, thereupon, this honorable court was directed and commanded to proceed and enforce the judgment aforesaid, according to law, notwithstanding the suing out of the said writ of error therein.

177, 178 And this defendant, further answering, also admits, that on or about the said 11th day of December, A. D. 1869, the mandate and order of the said Supreme Court was exhibited to and filed in this honorable court in the said cause; whereupon it was ordered and directed that the said complainant and said Wormley have execution of their said judgment, so recovered by them in this honorable court as aforesaid, and that they recover their costs and charges in that behalf and their costs in the said Supreme Court, and that they have execution therefor; and that on or about the 13th day of December, A. D. 1869, in pursuance of the order aforesaid, a writ of execution in favor of the said complainant and said Wormley, and against this defendant, was

issued out of this honorable court and under the seal thereof, directed to the marshall of the said northern district of Illinois to be executed, and commanding him to make the amount of said judgment and costs out of the property of this defendant, and payment of the said
179, 180 sum of money, damages, interest, and costs therein mentioned demanded, and this defendant thereupon paid the same in full to the said marshall, who returned the said writ of execution into this honorable court fully satisfied, and the money made thereon, as thereby commanded.

And this defendant, further answering, insists, and states the fact to be, that the said judgment so as aforesaid recovered in the said action at law by the said complainant and the said Charles Wormley against this defendant, and which was so paid by this defendant as aforesaid, was so recovered in consequence of certain alleged infringements by this defendant of the exclusive right claimed to have been granted and secured to the said complainant and the said Charles Wormley under and by virtue of the letters-patent of the United States to Joseph D. Cawood, referred to in said complainant's original bill of complaint, and the assignment thereof to them, and for damages claimed to have been sustained by the said complainant and said Wormley as the owners
181, 182 of said letters-patent, and the pretended exclusive rights granted thereby, by reason of the said alleged infringements prior to the commencement of the said action at law; and that the said damages so recovered in the said action and paid by this defendant are a part of the damages claimed and sought to be recovered by the said complainant in and by this said original bill of complaint aforesaid against this defendant and the said John M. Douglas. And this defendant insists that by the recovery of the said judgment, and the payment thereof as aforesaid, all damages for the alleged infringements of the said letters-patent by this defendant prior to the commencement of the said action at law, and which the said complainant and the said Wormley, then owning the said letters-patent and the exclusive rights under the same, could claim or be entitled to, was fully paid, satisfied, and discharged. And this defendant, denying the validity of said letters-patent and the in-
183, 184 fringements thereof as charged in the said original bill of complaint, insists upon the said judgment and the payment thereof as aforesaid as a satisfaction of so much of the damages sought to be recovered by the said complainant in his said original bill as accrued prior to the commencement of the said action at law, and the defendant will claim the same benefit of the said recovery and payment on the hearing of the said cause as though he had specially pleaded the same in bar of the portion of the relief sought by the said complainant above specially stated.

And this defendant, further answering, expressly denies that the said complainant is or can be entitled to any benefit or advantage of the said judgment in this proceeding, or that this defendant can or ought to be prejudiced by reason thereof in respect to its defence herein; and this defendant insists that it is not concluded by the said judgment or by the dismissal of the said writ of error so prosecuted thereupon as
185, 186 aforesaid, either as to the validity of the said letters-patent, or as respects the denial in these proceedings of the alleged infringement thereof subsequently to the commencement of the said action at law.

The defendant, further answering, says that it was and is advised by counsel, and verily believes, that in the proceedings and rendition of udgment aforesaid great injustice was done to this defendant, which this

defendant in good faith sought to correct by the suing out and prosecuting of the writ of error aforesaid from the said judgment. That this defendant, until shortly before the dismissal of said writ of error, expected that the same would be prosecuted to a final hearing of the said cause in the said Supreme Court upon the errors and exceptions alleged therein; but being then advised that objections of a technical character, growing out of the manner of the trial of said cause in this honorable court, might be interposed to prevent a full and fair hearing in said Supreme Court upon the merits of said cause, this defendant, for
187, 188 that reason, and for none other, consented to and directed the dismissal of the said writ of error, which, as this defendant insists, was without prejudice to the rights of this defendant further than that it was compelled thereby to pay the said judgment so unjustly recovered against it.

And this defendant, having fully answered the said matter of supplement set forth in the said complainant's supplemental bill of complaint, prays to be hence dismissed, &c.

ILLINOIS CENTRAL RAILROAD COMPANY,
By JNO. N. JEWETT,
Its Solicitor.

JNO. N. JEWETT, *Sol of Deft.*

Circuit court of the United States, northern district of Illinois.

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL RAILROAD COMPANY & John M. Douglas. } In equity.

189, 190 The replication of Samuel H. Turrill, complainant, to the answer of the Illinois Central Railroad Company, defendant, to the supplemental bill filed in said cause.

This repliant, saving and reserving unto himself all and all manner of advantage of exception to the manifold insufficiencies of the said answer, for replication thereunto saith that he will aver and prove his said bill to be true, certain, and sufficient in the law to be answered unto, and that the said answer of the said defendant is uncertain, untrue, and insufficient to be replied unto by this repliant, without this, that any other matter or thing whatsoever in the said answer contained, material or effectual in the law to be replied unto, confessed and avoided, traversed or denied, is true; all which matters and things this repliant is and will be ready to aver and prove as this honorable court shall direct, and humbly prays as in and by his said supplemental bill he hath already prayed.

SAMUEL H. TURRILL,
191, 192 By his solicitors, BECKWITH, AYER & KALES.

(Endorsed:) Filed Dec'br 16th, 1871. Wm. H. Bradley, clerk.

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL RAILROAD COMPANY AND John M. Douglas. } In equity.

This cause having heretofore been brought on to be heard upon the pleadings filed and the proofs taken therein; and the said pleadings and proofs having been read, and Mr. Curtis and Mr. Stoughton, of counsel for the complainant, and Mr. Gifford and Mr. Jewett, of counsel for the

defendant, having been heard, and the court having duly considered the said pleadings, proofs, and arguments, it is ordered, adjudged,
193, 194 and decreed that the patent granted by the United States of America to Joseph D. Cawood on the 9th day of September, A. D. 1856, for an improvement entitled in the schedule annexed to the said letters-patent "an improvement in the common anvil or swage-block for the purpose of welding up and reforming the ends of railroad rails when they have exfoliated or become shattered by unequal wear occasioned by the inequalities of the road," which is described in the bill of complaint filed in this cause, is a good and valid patent; and that by value of the several deeds of assignment in the said bill of complaint mentioned, the said letters-patent, and all the property, right, and interest in the said invention and improvement, as secured thereby, became vested in the said complainant at the time and in the manner and form in the said bill of complaint alleged.

It is also further ordered, adjudged, and decreed that the said complainant is entitled to the relief prayed for by the said bill; and
195, 196 it is ordered that it be referred to Henry W. Bishop, esquire, one of the masters in chancery of this court, to take the account between the said complainant and the said defendant company, prayed for in said bill of complaint; for the better clearing of which account the said defendant is hereby directed to produce before the said master, upon the oath of some one or more of its officers or agents having the charge or custody thereof, the annual reports made by the directors or officers of said company to its stockholders during the period covered by the said account, and also all books, papers, and writings relating to the said account or the subject-matter thereof, in the custody or power of the said company, its officers or agents. And the said master shall have power to require the parties to produce before him on oath, all books and papers relating to said account, and to hear such oral evidence and depositions as either party may produce, and on the motion of either of the parties to examine the adverse party, or his or
197, 198 its officers and agents, upon interrogations. And the said master is hereby directed to inquire and report what machines used by the defendant company infringe the patent of the said Cawood improvement, within the rules and principles stated in the written opinion of the court, this day filed in said cause, as well as what damages the said complainant has sustained by the use thereof; and for the better making of said report the said defendant company is hereby directed to produce before the said master a perfect model of each machine used by the said company, claimed on the one side and denied on the other to be an infringement of the said Cawood patent. The said master is to make his report touching the matters hereby referred to him with all convenient speed; and this court doth reserve all further directions until after the said master shall have made his report.

(Endorsed:) Filed Decbr. 16th, 1871. Wm. Bradley, Clk.

199, 200 And thereupon such proceedings were had in said court that on the said sixteenth day of December, one thousand eight hundred and seventy-one, the following decree was made and entered of record, to wit:

SAMUEL H. TURRILL
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY and John M. Douglas. } Chancery.

Now comes the complainant by his solicitor, who files the petition of

the complainant herein, from which it appears that the original bill of complaint in this cause was filed herein on the fifth day of June, A. D. eighteen hundred and sixty-eight; that the answer of the defendants thereto was filed on the seventh day of December, A. D. eighteen hundred and sixty-eight; that the replication to said answer was filed on the twelfth day of July, A. D. eighteen hundred and sixty-nine; that a supplemental bill of complaint, together with the answer of the de-
201, 202 fendant company thereto, was filed on the ninth day of March, A. D. eighteen hundred and seventy; that on the first day of July, A. D. eighteen hundred and seventy, a replication was filed to said answer to the supplemental bill; that a stipulation of the parties was filed and evidence taken upon the issue made; that said cause was heard on the pleadings, stipulation, and proofs filed, and on the eighteenth day of July, A. D. eighteen hundred and seventy-one, an interlocutory decree was entered of record; that afterwards and on the ninth day of October, A. D. eighteen hundred and seventy-one, the files and the record of the proceedings in said cause were destroyed by fire, without the fault or neglect of said complainant; that no certified copies of said files or record proceedings can be procured; that the complainant has preserved printed copies of the original and supplemental bills, the answer thereto, the stipulation of the parties, most of the evidence, and has supplied accurate copies of the replications and of the additional evidence taken and read by the complainant, and which he deems material, and
203, 204 interlocutory decree, and praying that they be substituted in the place of the original papers.

Thereupon, on motion of the complainant, by his solicitor, and as per stipulation filed, leave is given him to file said copies, and it is ordered that they be substituted for and stand in the place of said original and supplemental bills of complaint, the original and supplemental answer, the replications, stipulation, evidence, (so far as supplied,) and the interlocutory decree.

And it is further ordered that said interlocutory decree be entered of record, as follows: This cause having heretofore been brought on to be heard upon the pleadings filed and the proofs taken thereon, and the said pleadings and proofs having been read, and Mr. Curtis and Mr. Stoughton, of counsel for the complainant, and Mr. Gifford and Mr. Jewett, of counsel for the defendants, having been heard, and the court having duly considered the said pleadings, proofs, and arguments, it is ordered, adjudged, and decreed that the patent granted by the
205, 206 United States of America to Joseph D. Cawood, on the ninth day of September, A. D. eighteen hundred and fifty-six, for an improvement, entitled in the schedule annexed to the said letters-patent "An improvement in the common anvil or swage-block, for the purpose of welding up and reforming the ends of railroad-rails when they have exfoliated or become shattered by unequal wear occasioned by the inequalities of the road," which is described in the bill of complaint filed in this cause, is a good and valid patent, and that, by virtue of the several deeds of assignment in the said bill of complaint mentioned, the said letters-patent and all the property, right, and interest in the said invention and improvement, as secured thereby, became vested in the said complainant at the time and in the manner and form in the said bill of complaint alleged.

It is also further ordered, adjudged, and decreed that the said complainant is entitled to the relief prayed for by the said bill; and it is ordered that it be referred to Henry W. Bishop, esquire, one of
207, 208 the masters in chancery of this court, to take the account be-

tween the said complainant and the said defendant company prayed for in said bill of complaint, for the better clearing of which account the said defendant is hereby directed to produce before the said master, upon the oath of some one or more of its officers or agents having the charge or custody thereof, the annual reports made by the directors or officers of said company to its stockholders during the period covered by the said account, and also all books, papers, and writings relating to the said account or the subject-matter thereof, in the custody or power of the said company, its officers, or agents.

And the said master shall have power to require the parties to produce before him, on oath, all books and papers relating to said account, and to hear such oral evidence and depositions as either party may produce; and on the motion of either of the parties to examine the adverse party or his or its officers and agents upon interrogatories; and the said master is hereby directed to enquire and report what machines
209, 210 used by the defendant company infringe the patent of the said Cawood improvement within the rules and principles stated in the written opinion of the court this day filed in said cause, as well as what damages the said complainant has sustained by the use thereof; and, for the better making of said report, the said defendant company is hereby directed to produce before the said master a perfect model of each machine used by the said company, claimed on the one side and denied on the other to be an infringement of the said Cawood patent. The said master is to make his report touching the matters hereby referred to him with all convenient speed; and this court doth reserve all further directions until after the said master shall have made his report.

And afterwards, to wit, on the eleventh day of November, A. D. 1872 Henry W. Bishop, the master to whom this cause was referred under the foregoing decree, made and filed his report, which, together with the exceptions filed thereto, reads in the words and figures following, to wit:

211 *Master's report.*

To the honorable the judges of the said court:

This cause has been, by an interlocut'ry decree of the court, referred to the undersigned, as master, to report what machines used by defendants infringe the patent of the Cawood machine within the rules and principles expressed in the written opinion of the court filed in this cause, and what damages the plaintiff has sustained by such use.

The court has decided the patent to be valid, determining its construction, and laid down the principles by which the master is to be guided in the determination of the questions submitted to him.

Very much testimony has been taken by defendants, under objection, in regard to the number of machines not shown to have been used by the defendants, and for this reason has not been considered by me as coming within the limits of this inquiry, which is:

I. Do the machines used by the defendants infringe the plaintiff's patent, embodying the improvements described in it; and this is to be determined by comparing the machines of the defendants with that of the plaintiff, as it is described in his patent and construed by the court, rejecting in the comparison all others made before or after it.

212 The answer of the defendants admits the use by them of seven machines in addition to the Cawood, viz:

1. The Illinois Central.

2. The Etheridge.
3. The Whitcomb or Cleveland block.
4. The Michigan Southern.
5. The bayonet-vise.
6. The Beebe & Smith.
7. The Baine's reversible rolls.

And the plaintiff claims them all to be infringements of his patents.

The rules of the court do not allow me to present an abstract of the testimony upon which my conclusions are based, or recite any portion of it; and indeed in this case, so voluminous is it, that it would be impracticable to do so at all in detail. I have, however, examined with great care all the testimony relating to this inquiry, and listened attentively to the suggestions of the respective counsel, and after a careful consideration of the testimony, and examination and comparison of the machines of the defendants and of the complainant, I have become satisfied and report:

That each and all of the machines heretofore mentioned as having been used by the defendants do infringe the plaintiff's patent within the rules and principles laid down by the court.

II. As to damages, which are the profits made by the defendants by the use of the plaintiff's patent:

The evidence shows that the only other appliances used for this purpose by the defendants was the common anvil or swedge block; and I have therefore made a comparison of the cost of doing the work of repairing by this process and upon the Cawood machine.

Taking, therefore, the cost of labor and coal as the principal elements entering into the calculation, and there appearing to be no dis-
213 tinction recognized by the witnesses who have made use of them between the different machines used by the defendants, I have considered them together, making no difference in favor of either, but giving the average cost of all, as established by the testimony of the witnesses.

I find that the average cost of labor and fuel per foot on the common anvil is ninety-seven and four-fifths cents, (97 4-5,) and the average cost of labor and fuel on the machine used by the defendants to be thirty-five and one-half cents (35 1-2) per foot, leaving a profit from the use of plaintiff's machine of sixty-one and fifty-three hundredths cents (61 53-100) per foot. These are the average prices from soon after the date of complainant's patent to September 9th, 1870, as appears from the testimony of witnesses who have been actually engaged in the business of repairing rails.

I have therefore adopted that sum as the basis of my calculation.

I also find that the average number of feet mended per day by the old common anvil process and the new process is as twenty-three (23) to seven and one-half (7 1-2) feet, showing a difference in favor of the Cawood machine of fifteen and one-half (15 1-2) feet per day. This calculation is also based upon the testimony of witnesses who have used both methods, and who have been engaged in the actual business of repairing rails upon roads where they were respectively employed.

By the terms of the decree the defendants were required to produce before the master perfect models of the machines used by them, together with the annual reports made by the directors or officers of said company to its stockholders during the period covered by the account, and also all books and papers relating to said account in their custody. This they have done in a majority of cases, and in those instances computations have been made predicated upon such reports, and in all cases

where this has not been done, averages have been made based on such reports and the testimony of the witnesses.

214 From which I find that there is due complainant for the use of his patent—

From the Illinois Central Railroad Company the sum of..	$331,150 40
From the Pittsburgh and Fort Wayne Railroad Company the sum of.....	76,134 50
From the Chicago, Burlington and Quincy Railroad Company the sum of.....	78,158 63
From the Michigan Southern and Northern Indiana Railroad Company the sum of.....	935,115 97
From the Chicago, St. Louis and Alton Railroad Company the sum of.....	129,173 18

All of which is respectfully submitted.

HENRY BISHOP,
Master in Chancery of the Circuit Court of the United States for the Northern District of Illinois.

NOVEMBER 7, 1872.

Exceptions to master's report.

Exceptions taken by the defendants to the report made herein by Henry W. Bishop, one of the masters of this court, and to whom this cause was referred by a decree herein made and entered on — day of ———, 18—, which report bears date the 7th day of November, 1872.

1. For that the said master assumed in his report that the court had determined the construction of the patent upon which suit was brought.

2. For that the said master assumed that the court had sufficiently defined the construction of said patent to enable him to
215 pass upon the questions of infringement without recourse to the previous state of the art, or considering what was known prior to the alleged invention of Cawood.

3. For that the said master declined and refused to construe said patent.

4. For that the said master declined and refused to consider the pre-existing state of the art in determining what machines were infringements on the Cawood patent.

5. For that the said master, in determining what machines were infringements on said patent, excluded and *re*-refused to consider the evidence taken on the part of the defendants to show the state of the art as it existed prior to the time of the alleged invention of Cawood.

6. For that the said master undertook to find what machines were within the patent, without finding or knowing what was the scope of the patent.

7. For that it does not appear, from the report of said master, what he assumed to be the scope or extent of said patent.

8. For that the said master, in determining and deciding that each and all the machines named in his report as having been used by the defendants infringe the plaintiff's patent, refused to receive or consider evidence taken and offered on the part of the defendants, showing that several of those machines were the same in principle, construction, and mode of operation as machines which were known and in public practical use prior to the time of the alleged Cawood invention.

9. For that the said master assumed, and so stated in his report, that the question as to whether or not the machines used by the defendants

infringe the plaintiff's patent, is to be determined by comparing the machines of the defendants with that of the plaintiff, as it is described in the patent and construed by the court, rejecting in the comparison all others made before or after it.

216 10. For that the said master has decided, and in and by his said report stated, that the machine called therein The Illinois Central infringes the plaintiff's patent within the rules and principles laid down by the court.

11. For that the said master has decided, and in and by his report stated, that the machine called the Etheridge infringes the plaintiff's patent within the rules and principles laid down by the court.

12. For that the said master has decided, and in and by his said report stated, that the machine called the Whitcomb or Cleveland infringes the plaintiff's patent within the rules and principles laid down by the court.

13. For that the said master has decided, and in and by his said report stated, that the machine called the Michigan Southern infringes the plaintiff's patent within the rules and principles laid down by the court.

14. For that the said master has decided, and in and by his said report stated, that the machine called the bayonet-vise infringes the plaintiff's patent within the rules and principles laid down by the court.

15. For that the said master has decided, and in and by his said report stated, that the machine called therein the Beebe and Smith infringes the plaintiff's patent within the rules and principles laid down by the court.

16. For that the said master has decided, and in and by his said report stated, that the machine called therein the Baine's reversible rolls infringes the plaintiff's patent within the rules and principles laid down by the court.

17. For that the said master, in and by his said report, has assumed that it was matter of necessity for defendants to use either the old *swedge*-block or the patented invention to mend their rails.

217 18. For that the said master, in and by his said report, has decided, against evidence to the contrary, that if the defendants had not used the machine they did use to mend rails they would have used the old *swedge*-block.

19. For that the said master, in and by his said report, has assumed that it was profitable for the defendants to use the patented invention to mend rails, when the contrary was proved by the defendants.

20. For that the said master, in making his report, rejected and refused evidence taken by the defendants, proving that there was no profit or advantage to the defendants from using the machines they did use in mending rails.

21. For that said master, in arriving at the amount of profits, reported by him, rejected and refused to consider evidence taken by the defendants, proving that it was more advantage and profit to them to reroll damaged rails than to mend them by the machines they used.

22. For that the said master did not find and report that the defendants realized no profit in mending rails by the use of the machines they used, notwithstanding a large number of witnesses testified that there was no advantage or profit in mending rails by the use of such machines, and notwithstanding there was no evidence to the contrary.

23. For that the said master did not find and report that it would have been more profitable to the defendants to have had their damaged

rails rerolled by means open to the public, and free to be used, than to have had them mended by the machines they used.

24. For that the said master has based his report on the assumption that if the defendants had not used the machines they did they would have used the old *swedge* block.

25. For that the said master refused to consider and rejected
218 all evidence offered on the part of the defendants proving, or tending to prove, that there were well-known ways by which the defendants could have disposed of their damaged rails as profitably or more profitably to themselves than to have had them mended as they did.

26. For that the said master has assumed, and so found by his report, that there was no difference in the cost and expense to the defendants of using their several machines.

27. For that the said master has assumed that there was no difference in the cost of the several machines used by the defendants.

28. For that the said master has made no allowance for the cost, or for the difference in the cost, of such defendants' machine.

29. For that the said master has not found the cost, to the defendants, of the machines named in his report, and has not found the cost of the common anvil.

30. For that the said master has not found the difference in cost to the defendants between each and all of the machines named therein and the common anvil.

31. For that the said master, in making up the amount of profits reported by him, neglected and refused to consider evidence, taken by the defendants, tending to show that there was more advantage and profit to the defendants in cutting off and rerolling the damaged portions and relaying the sound portions of rails than in mending such damaged portions upon the machines used by them.

32. For that the said master, in the making up of his report, failed and refused to consider proper and pertinent testimony taken in behalf of the defendants upon the question of damages, and that the said report is inconsistent with and not based upon the testimony submitted to the said master under the decree of reference entered in said cause.

219 In each and all of which particulars the defendants except to the report of the said master as erroneous, and appeal therefrom to the judgment of this honorable court.

JOHN N. JEWETT,
Solicitor for Defendants.
GEORGE GIFFORD,
Of Counsel.

220

221, 222 And afterwards, to wit, on the eighteenth day of July, one thousand eight hundred and seventy-three, in the record of the proceedings of said court appears the following entry, to wit:

SAMUEL H. TURRILL
v.
ILLINOIS CENTRAL R. R. CO. } Bill.

Now come the parties by their solicitors, and thereupon comes on to be heard the exceptions of the defendant to the report of the master herein, and after argument, the court not being sufficiently advised thereon, takes the same under advisement.

And afterwards, to wit, on the twenty-fifth day of July, one thousand eight hundred and seventy-three, in the record of the proceedings of said court appears the following entry, to wit:

SAMUEL H. TURRILL
v.
ILLINOIS CENTRAL RAILROAD COMPANY ET AL. } Chancery.

223, 224 The exception to the master's report having been heretofore argued by the counsel of the respective parties, and the court being now sufficiently advised, sustains the sixteenth exception filed to the master's report, and overrules all the other exceptions as filed by the defendants. And it is ordered that the case be referred back to the master to report the damages sustained by the plaintiff by the use by the defendants of the other machines named by him in his original report, except the Bain machine. And it is further ordered that the master may have leave to reconsider his finding as to the cost of fuel and labor in repairing rails on the common anvil and the plaintiff's machine, and may hear additional evidence in relation thereto and the arguments of counsel, and report such conclusions as in his opinion may be warranted by the whole testimony.

225, 226 And afterwards, to wit, on the 22d day of October, A. D. 1873, said master, to whom this cause was rereferred, came and filed his report in accordance with the decree of the court entered in this cause on the 25th day of July, A. D. 1873, which report is in the words and figures following, to wit:

In the circuit court of the United States for the northern district of Illinois.

SAMUEL H. TURRILL
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY and John M. Douglas. } In chancery.

SAME
vs.
THE CHICAGO, BURLINGTON AND QUINCY RAILroad Company and Amos T. Hall. } "

SAME
vs.
THE MICHIGAN, SOUTHERN AND NORTHERN Indiana Railroad Company and E. B. Phillips. } "

227, 228 SAME
vs.
THE CHICAGO AND ALTON RAILROAD COMpany and T. B. Blackstone. } "

SAME
vs.
THE PITTSBURGH, FORT WAYNE AND CHIcago Railway Company. } "

Master's report.

To the honorable the judges of said court:

This cause having by a decree of this court, entered on the 25th day of July, A. D. 1873, been referred back to the undersigned as master for the purpose of deducting from the former report made by him the amount of profit therein reported against those defendants who have made use of the machine known as the Bain machine, which the court has found not to be an infringement of the complainant's patent, and liberty having been therein given to review said report,
229, 230 I have proceeded to ascertain, in accordance with the said decree, the amount of profits reported by me in my said report against the Illinois Central Railroad Company and the Michigan Southern and Northern Indiana Railroad Company as the result of the use they had made of the said Bain machine, the above-named defendants being the only ones found by me to have used the same.

And I find that there was embodied in my former report and charged against the said Illinois Central Railroad Company as due to the complainant the sum of one hundred and fourteen thousand four hundred eighty-nine $\frac{68}{100}$ ($114,489.68) dollars, the same being the profits from the use of the said machine, deducting which sum I now find that there is due to the complainant from the said defendant the sum of two hundred and sixteen thousand six hundred and sixty $\frac{72}{100}$ ($216,660$\frac{72}{100}$) dollars.

231, 232 And I find that there was embodied in my former report and charged against the said Michigan Southern and Northern Indiana Railroad Company as due to the complainant the sum of one hundred and three thousand nine hundred and twenty-seven $\frac{53}{100}$ ($103,927$\frac{53}{100}$) dollars, the same being the profits from the use of the said machine, deducting which sum I now find that there is due to the complanant from the said defendant the sum of eight hundred and thirty-one thousand one hundred and eighty-eight $\frac{44}{100}$ ($831,188.44) dollars.

And I further report that upon this hearing the following written request was made to me by the counsel for the respective respondents:

"The said defendants, by their solicitors, offered further testimony in relation to the comparative cost of labor and fuel used in the repairing of railroad-bars upon the common anvil or swage block, and upon the several machines adjudged by the court to be infringements of
233, 234 the said complainant's patent, and tending to show that the difference in cost of said labor and fuel was less than stated in the former report of the master in said causes.

"And the counsel for the Chicago and Alton Railroad Company further offered evidence to prove that the average mend per rail on said road was only six inches instead of eighteen, as found by the master in his former report, and also to prove that the master had mistaken the evidence already in the case as to the number of rails mended on said road from April 1st, 1869, to September 9th, 1870, and had thereby found the number of said rails to be largely in excess of the truth.

"And the counsel for the Pittsburgh, Fort Wayne and Chicago Railway Company further offered evidence to prove that a large proportion of the rails repaired on said road and included in said first report of the said master were repaired in other ways and by
235, 236 other means, and not on any of the several machines found by the court to be infringements of said Cawood patent, and also to explain the item of expense for repairing rails given in the annual reports filed by said company under the order of reference in said cause."

But considering it to be my duty only, under the decree of this court by which this cause is again referred to me, to determine whether my conclusions upon the testimony offered when the question of the amount of profits was first referred to me were correct or not, I have not regarded it to be within my province under this order to re-open this cause, acting as I am, in obedience to the last decree, and finding, as I do, that the evidence contained in the record is such that I must re-affirm the conclusions contained in my former report, except as herein stated.

By the decree of reference I was permitted to review my former findings. This I have done, and finding no error in my former
237, 238 report as to the amount due from the other respondents for the use of the complainant's machine, I am compelled to again report that there is due to the complainant from the Chicago, Burlington and Quincy Railroad Company the sum of seventy-eight thousand one hundred and fifty-eight $\frac{63}{100}$ dollars, ($78,158.63.)

From the Illinois Central Railroad Company the sum of two hundred and sixteen thousand six hundred and sixty $\frac{72}{100}$ dollars, ($216,660.72.)

From the Pittsburgh, Fort Wayne and Chicago Railway Company the sum of seventy-six thousand one hundred and thirty-four $\frac{50}{100}$ dollars, ($76,134.50,) no distinction appearing in the record as to the old and new road.

From the Michigan Southern and Northern Indiana Railroad Company the sum of eight hundred and thirty-one thousand one hundred eighty-eight $\frac{44}{100}$ dollars, ($831,188.44.)

From the Chicago and Alton Railroad Company the sum of one hundred twenty-nine thousand one hundred seventy-three $\frac{18}{100}$ dollars, (129,173.18.)

239, 240 All of which is respectfully submitted.

HENRY W. BISHOP,
Master in Chancery of the Circuit Court of the United States for the Northern District of Illinois.

Dated Chicago, October 20th, 1873.

(Endorsed:) Filed Oct. 22d, 1873.

And afterwards, to wit, on the third day of November, one
241, 242 thousand eight hundred and seventy-three, in the records of the proceedings of said court is the following entry, to wit:

SAMUEL H. TURRILL
v.
THE ILLINOIS CENTRAL RAILROAD COMPANY et al. } In chancery.

Now come the parties, by their solicitors, and now comes on to be heard the motion of the defendants to recommit to the master his report filed herein; and after hearing a part of the arguments of counsel, the hour of adjournment having arrived, the further hearing is postponed until to-morrow morning.

And afterwards, to wit, on the 6th day of November, one thousand eight hundred and seventy-three, in the records of the proceedings of said court is the following entry, to wit:

SAMUEL H. TURRILL
vs.
243, 244 THE ILLINOIS CENTRAL RAILROAD Company et al. } In chancery.

Now come again the parties, by their solicitors, and now comes on

further to be heard the motion of the defendants to recommit to the master his report filed herein; and after hearing additional arguments of counsel, without concluding the same, the further hearing is postponed until to-morrow morning.

And afterwards, to wit, on the 7th day of November, one thousand eight hundred and seventy-three, in the record of the proceedings of said court is the following entry, to wit:

SAMUEL H. TURRILL
v.
THE ILLINOIS CENTRAL RAILROAD COMPANY and JOHN M. DOUGLASS. } In chancery.

Now come again the parties, by their solicitors, and now comes on further to be heard the motion of the defendants to recommit
245, 246 the master's amended report, filed October twenty-second, eighteen hundred and seventy-three, for certain reasons indicated in said motion, to be by him further amended; and after hearing the concluding arguments of counsel, the court being fully advised in the premises, and being of the opinion that said motion should be allowed, it is hereby ordered, adjudged, and decreed that said report of said master be, and the same is hereby, recommitted to him, and that on such recommittal the master be instructed to hear such further evidence as the parties in said several causes may introduce before him, subject to the following conditions:

Said defendants shall be at liberty to introduce before said master such evidence as they may see fit bearing on the question of the amount of damages, the total number of witnesses introduced by all said defendants in said several suits not to exceed fifteen, and
247, 248 all of said evidence to be closed by the first day of December, eighteen hundred and seventy-three; and the said complainant shall be at liberty in like manner to offer evidence in rebuttal as to said damages, the total number of witnesses so to be introduced by said complainant not to exceed fifteen, and all of said complainant's testimony to be closed by the twenty-first day of December, eighteen hundred and seventy-three, after which no more testimony shall be introduced by either party unless by special order of court obtained for that purpose; all of said testimony, both for complainant and defendants, to be taken before the said master unless otherwise agreed by said parties. And it is further ordered that all the expense of taking said testimony, excepting the printing of the same, and including the proper and necessary witness-fees, and the proper fees of complainant's counsel in attending the taking of said testimony, to be hereafter determined by the court, shall be paid by defendants.

249, 250 And it is further ordered that the said master, in making up his further amended report, shall report to the court all the evidence introduced before him in the said causes and used in the preparation of his said report, and shall also state and show to the court either in the body of said report or in schedules to be annexed thereto the following facts, as the same may be found by him:

First. The number of rails he finds to have been mended on said adjudged infringing machines by each one of said defendant railroads respectively.

Second. The number of feet and inches per rail he finds to have been so mended by each one of said roads respectively.

Third. The cost per foot of mending rails on the common anvil or swage block, and the cost on said adjudged infringing machines, showing what items he considered in estimating said cost and the cost of each of said items respectively.

Fourth. To state in what way he has made said several esti-
251, 252 mates above named; whether as to each of said defendants' roads severally, or as to all of them together; and,

Fifth. To state the period of time within which he finds said damages to have accrued as to each of said defendant roads respectively, with liberty to either party to apply to the court for further directions as the case may require.

And afterwards, to wit, on the ninth day of May, one thousand eight hundred and seventy-four, Henry W. Bishop, esq., master, to whom this cause was re-referred, makes and files his report, which is in the words and figures following, to wit:

253 *Master's report.—Filed May 9th*, 1874.

To the honorable the judges of said court:

An interlocutory order of the court was entered in these causes on the 7th day of November, A. D. 1873, recommitting the amended report filed by me on the 22nd day of October last, and directing me to hear any additional testimony which the respective parties might offer upon the question of the amount of damages.

In compliance with this order, I have heard and considered the testimony taken and presented on the part of the defendants, which is of two classes: that which relates to the amount of saving from the use of the complainant's machine and that which relates to the amount of work done by the several defendants upon the machines which have been adjudged to be infringements of the complainant's machine.

253½ I have also heard and considered such testimony as has been taken by the complainant in rebuttal, and I have re-examined the testimony which was before presented upon this question of profits in connection with that more recently taken and presented.

I am required by the order to return to the court all of the testimony submitted to and made use of by me in this reference, and I shall therefore present no abstract of it herewith.

Testimony has been taken at great length, and is very conflicting, as to the amount saved per foot to the defendants by the use of the infringing machines in repairing rails instead of the common swage-block, the witnesses differing greatly in their statements as to the cost of accomplishing the purpose by the methods referred to, and the additional accounts or memoranda, which appear to be original or accurate, now submitted by any of the parties, showing the cost per foot by either process, relate to different periods of time and to widely different localities.

The testimony does not vary essentially in its general features from that which I had before me and considered in the preparation of my former report, but is more extensive in its range in furnishing the opinions and experience of persons who have been employed upon or connected with a greater number of railroads, a majority of which are in the eastern part of the country.

Upon carefully examining all of the testimony which has been introduced in these causes, and comparing that portion of it bearing directly upon this point, either containing direct evidence of the cost per foot at

which rails have been repaired upon the common machine and
254 upon any of the machines used by the defendants, or which furnishes certain data from which the result may be derived, I find and report that the profit to the defendants by repairing rails upon the complainant's machines was forty-eight (48) cents per foot.

This is the average result arrived at by me upon the most accurate calculations, as to the cost by the respective methods, I have been able to make, after a full and careful examination of the testimony of the following witnesses, whose evidence was offered under this interlocutory order:

H. Lewis, defendants' additional record ..... Page 1
E. Lebart, " " " ..... " 24
A. L. Harris, " " " ..... " 59
C. T. Ham, " " " ..... " 85
H. Anderson, " " " ..... " 137
A. T. Shaw, " " " ..... " 189
J. H. Lakey, complainant's " ..... " 518
M. Arnold, " " ..... " 531

in connection and comparison with the testimony before submitted, of the following witnesses:

E. A. Perkins, complainants' record ..... Page 104
Henry Foster, " " ..... " 108
G. McQuestion, " " ..... " 114
J. Connor, " " ..... " 127
P. A. Craig, " " ..... " 153
P. Worrall, defendants' original " ..... " 26
J. W. Smith, complainant's " ..... " 172
W. T. Ragland, " " ..... " 180
S. Lawler, defendants' original " ..... " 76
A. Maxwell, complainant's " ..... " 236
M. Cornelius, " " ..... " 221
A. A. Stone, " " ..... " 235
L. H. Clark, " " ..... " 204
M. Pearson " " ..... " 133
254½ S. Stewart, defendants' original record ..... " 3
D. Rooney, complainant's " " ..... " 141
J. McCormick, " " " ..... " 175
J. C. Ragland, " " " ..... " 250
M. McMullen, " " " ..... " 215
W. Callow, defendants' " " ..... " 115
B. Christner, complainants' " " ..... " 144
C. C. Dodge, " " " ..... " 160
F. Marker, " " " ..... " 170
W. A. Huntoon, " " " ..... " 225
J. Donnelley, " " " ..... " 250
A. Snodgrass, " " " ..... " 256
J. A. Lakey, " " " ..... " 198
D. Ferenbeck, defendants' " " ..... " 41
W. Sheard, complainants' " " ..... " 253
J. H. Hoyt, defendants' " " ..... " 6
I. C. Buckhout, " " " ..... " 11
E. M. Read, " " " ..... " 16
M. W. Oliver, " " " ..... " 35

I have, therefore, adopted this sum as the basis of the calculation made by me in determining the amounts due respectively from the several defendants.

All of these cases have been, throughout the whole proceeding before me, in reality conducted as one cause, in respect to this particular question, and no means have been afforded me from the testimony to make several findings against the defendants as to this question, no evidence having been offered by them tending to show that the same finding as to the amount of saving per foot would not equitably apply to all alike; nor has any argument been made before me at the late hearing upon this subject.

255 Evidence has been introduced by the defendants tending to show that, in the opinion of the witnesses, the machine of the complainant possesses no utility in the repairing of rails superior to that of the common swage-block. It will be observed that, in determining the saving by the use of the device of the complainant, I did not and could not make use of this testimony, for I do not think that evidence of a want of utility in the patent is applicable to the present inquiry, in view of its voluntary adoption and long-continued use by the defendants, whether it might or might not have been important at an earlier stage of these causes; and I find nothing in the testimony of these witnesses which assists me in measuring the superiority of the complainant's machine, as I am obliged to do in taking this account.

I am directed by this decree to report what items I have considered in estimating the cost of repairing rails upon the common and improved swage-block, and the cost of each of said items.

It will be seen that in the depositions of the witnesses I have referred to, and which are herewith reported to the court, the separate cost of the fuel and labor employed are not always given, and that in some cases the total cost per foot from these two items together is given; and that with many of these depositions it is not necessary, even when it is possible, to calculate these items separately in order to ascertain the cost of repairing upon the machine used by the witness.

Though I did not reach the conclusion above stated in precisely the way the order seems to imply, because I did not think it safe and proper to depend entirely upon it, in view of the nature of the testimony before me as a whole, I annex the following in obedience to the order:

256 *Cost of labor and fuel on defendants' roads.*

Wages per diem, foreman or blacksmith, average	$3 00
" " two helpers	3 77
Fuel per diem, three hundred pounds, at 45 cts. per 100	1 35
Total	$8 12

Considering the saving by the use of the complainant's machine to be in direct proportion to the amount of work performed upon the machine, as compared with the devices formerly in use, and taking as the basis of calculation on the one hand the smallest number of inches shown to have been repaired upon the complainant's machine in the ordinary prosecution of business by the day's work as fixed by actual measurement, viz, 240 (two hundred and forty) inches per day; and, on the other hand, the highest number of inches I find to have been repaired on the common swage-block, by actual measurement, even where the

work was performed by contract, viz, 110 (one hundred and ten) inches per day, the gain from the use of the complainant's machine is $9.59 in mending 240 inches, or $47\frac{18}{24}$ c. per foot.

Again, taking the lowest rate of wages paid by any of the defendants, at any period, so far as the testimony shows, viz:

Foreman	$2 25
Two helpers	3 20
Fuel, as before	1 35
	$6 80

and considering the average work per day with the common swage-block as 100 inches, which I find to have been the highest number of inches of actually measured work repaired thereon in the ordinary prosecution of business by day's work, and the average day's work with the complainant's machine, and work performed at day's wages, as
257 being 250 inches, the saving by the use of the complainant's machine is 1½ the sum of the day's wages and fuel, or $10.20, or $48\frac{24}{25}$ cents per foot.

In arriving at the question of saving, I have considered only the items of fuel and labor, though I think there is evidence in the case tending to show a saving in the amount of iron employed by the use of the complainant's machine, and also a saving in the wages of workmen, resulting from the difference of skill required. But I did not understand, from the argument of complainant's counsel, that either of these items is insisted upon.

As to the question of the amount of work done by the several defendants upon the infringing machines, testimony has been offered on the part of the Illinois Central Railroad Company, the Chicago & Alton Railroad Company, and the Michigan Southern & Northern Indiana Railroad Company; and as the cases presented by the evidence are distinct I shall consider them seperately.

THE ILLINOIS CENTRAL RAILROAD COMPANY.

It appears from the testimony taken in this case that in the statement (prepared by the assistant engineer, and which appears in the answer of this defendant) of the rails mended on the infringing machines, and also of those reported to me as having been mended after the date of the answer to the close of the accounting, there were included rails shown by reports made to the office of the chief engineer, from which the statements were prepared, to have been in fact cut off at the end, because they were too much injured to be restored to shape, and were not actually repaired upon the complainant's machine.
258 I have, therefore, deducted these rails from my former finding against this defendant, reckoning them at six (6) inches per rail, as they were reckoned in the accounts.

There is also evidence showing that said engineer, in the accounts of work reported from such shops as did not distinguish in their accounts between cut and repaired rails, included rails that were in fact cut off at the end, but the evidence does not show the actual proportion.

There was also evidence offered tending to show that at other shops of the defendant rails were cut off at the end, which might have been included in the account of rails furnished me as repaired on the complainant's machine, but does not show the number.

Upon a careful examination of these two classes of evidence I have

made a further deduction from the number of rails formerly found by me to have been repaired by this defendant, as I think the evidence will justify, viz, one-sixth ($\frac{1}{6}$) part of the whole number repaired; and in doing so I take into consideration the facts, which appear from the evidence, that some of the rails returned as mended were in fact straightened, or repaired upon the flange of the rail, without the use of the complainant's machine, and some, though I cannot tell how many of them, cut off at the end were also mended at the other end or in the middle on the complainant's machine.

The following schedule shows the number of rails I charged against the defendant in my former report; the number I have deducted therefrom, beyond the number actually mended by them in violation of the patent of the complainant; the number of inches charged before and the number I have deducted therefrom; and the number of feet repaired with which they are now charged, and the period of time within which I find the profits to have occurred.

259 The testimony of the following witnesses was used by me in this calculation, and is herewith reported:

J. T. Barnett, additional record			page 355
J. J. Wieber,	"	"	" 358
J. M. Healey,	"	"	" 381
W. B. Ainsworth,	"	"	" 388
L. P. Morehouse,	"	"	396, 539

SCHEDULE.

Illinois Central Railroad.

Shop.	Total No. rails.	No. cut.	No. mended	No. of inches reported.
1856–1861.				
Weldon	12,000	$\frac{1}{6}$ 2,000	10,000	216,000
"	7,259	$\frac{1}{6}$ 1,208	6,051	172,323
Champaign	44,478	$\frac{1}{6}$ 7,413	37,065	959,997
	11,350	8,513	2,837	
1868–9.				
Du Quoin	19,668	3,009	16,659	280,668
Jonesboro	4,844	885	3,959	72,672
Centralia	2,554	$\frac{1}{6}$ 543	2,011	29,538
Dubuque	2,530	$\frac{1}{6}$ 421	2,109	53,440
Dyersville	2,546	$\frac{1}{6}$ 424	2,122	59,040
Vandalia	9,568	1,518	8,050	102,006
Decatur	10,672	2,003	8,669	114,555
Forreston	15,989	.....	15,989	260,790
El Paso	12,897	907	11,990	157,476
La Salle	12,402	1,767	10,535	231,761
Nova	27,715	1,730	25,985	441,167
Galena	25,467	801	24,666	406,375
Total	221,939	33,142	188,797	3,557,828

Total No. of rails	211,939	Total inches	3,557,828
" " cut rails	33,142	at six "	198,828
Balance	188,797	In inches	3,358,976
Paid for in suit at law	3,041	"	52,913
	185,756		3,306,063

260 Dividing No. of inches by No. of rails..... 17.71 in. per rail.
Reduced to feet, 3,306,063 inches..= 275, 504¼ feet.
Add 1,862 frogs, at 13 feet each..... 24, 602 "

Total..... 300, 107¼ "

At 48 cents per foot, $114,051.48.

I find the average mend per rail upon this road to be 17.71 inches per rail.

And I find and report that there is due the complainant from this defendant the sum of $144,051.48 (one hundred and forty-four thousand and fifty-one and forty-eight one-hundredths dollars.)

THE CHICAGO & ALTON RAILROAD COMPANY.

I am satisfied, from the testimony recently introduced by this defendant, that there was a general, though not a uniform, practice with them to cut off the ends of rails that were too much injured to be restored by the use of the device of the complainant, which were returned as mended rails, and included in the accounts which appear in the answer filed by this defendant and that which was subsequently submitted to me, and included by me in my former report; and it also appears that there were also rails straightened, and mended in the flange, without resorting to the swage-block.

I am not able, however, to determine the proportion of the rails returned as repaired which were not, in fact, repaired on the complainant's machine, as no separate accounts appear to have been kept showing the numbers, although the evidence tends to show that a considerable proportion of them were so dealt with.

261 It appears also from the evidence of:

J. Flavan, additional record..... page 170
K. F. Booth, " " ..... "
W. T. Ragland, " " ..... " 407
A. Reed, " " ..... " 254
N. Cornell, " " ..... " 105
W. Huskinson, " " ..... " 160

that a portion of those cut off were mended at the other end or in the middle.

In estimating the number of cut rails returned in this case as mended rails, I have availed myself of the certain data offered by the returns made by the Illinois Central Railroad Company, as the work appears to have been done about the same time, under about the same conditions and the same circumstances. I have thought this course equitable and just in the absence of such certain and positive testimony as would enable me to arrive at more exact results upon it. I have, therefore, in this case also deducted one-sixth ($\frac{1}{6}$) part from the entire number returned as repaired and charged against this defendant in my former report, as not having been repaired upon complainant's machine.

The testimony of the following witnesses is herewith returned in this connection:

J. McCormick, additional record..... page 175
J. Monk, " " ..... "
D. Rooney, " " ..... " 141, 286
M. Flynn, " " ..... " 477

T. B. Blackstone, " " ..... " 362
David Rowe, " " ..... " 385
W. Costigan, " " ..... " 498
262 J. Quaid, additional record ..... page 54
N. Cornell, " " ..... " 105
W. P. Lee, " " ..... " 149
W. Huskinson, " " ..... " 160
J. Flavan, " " ..... " 171
W. E. Henry, " " ..... " 248
A. Reed, " " ..... " 254
T. White, " " ..... " 265
K. F. Booth, " " ..... " 306
T. Lee, " " ..... " 337
J. C. McMullin, " " ..... " 331

There was also evidence tending to show that the amount of mending per rail was not so large during the latter part of the time of the use of the complainant's machine by the defendants, and the personal examination, for which opportunity was recently afforded me, has satisfied me that the same number of inches per rail formerly found by me was not the proper one, as the average mend on the line of this road for the whole period, covered by the accounting.

I have, therefore, deducted one-third ($\frac{1}{3}$) from my former finding, and now find and report the average mend to have been twelve (12) inches per rail.

The following schedule shows the number of rails and number of feet which the defendant is charg'able after deducting as above:

The testimony of
Daniel Rooney, complainant's record ..... page 118
" " defendants' add. " ..... " 286
T. B. Blackstone, " " " ..... " 362–378
is also referred to.

263 SCHEDULE.

Chicago & Alton Railroad.

Number of rails repaired from June 1st, 1865, to September 9th, 1870	134,170
Deduct $\frac{1}{6}$ for cut rails	22,461
Balance	119,309

At 48 cents per foot, (12 inches to a rail,) $53,908.32.

I therefore find and report that there is due to the complainant from this defendant the sum of $53,908.32, (fifty-three thousand nine hundred and eight $\frac{32}{100}$ dollars.)

THE MICHIGAN SOUTHERN & NORTHERN INDIANA RAILROAD COMPANY.

The Michigan Southern & Northern Indiana Railroad Company also offered evidence showing that the same course was pursued by them in regard to the cutting the ends of rails that were badly injured as the preceding roads; the evidence tending to show that such rails as were cut, straightened, or otherwise treated without the use of complainant's

device were returned as mended rails, and included in the accounts formerly before me.

The evidence upon this subject is substantially the same as in the case of the Chicago & Alton Railroad Company, and it is not necessary to give any summary of it. I have made the same deduction of one-sixth ($\frac{1}{6}$) from the number of rails formerly found by me to have been mended by this defendant upon the complainant's device as being the nearest the facts I am able to arrive at after a careful examination and consideration of the evidence.

264 I have also reduced my former finding of the average number of inches mended per rail from twenty-four (24) to eighteen (18) inches per rail.

The depositions of the witnesses—

W. T. Ragland,	complainant's	record	page 180
H. Ferenbeck,	defendants'	"	" 183
A. Congdon,	"	"	" 158
D. Brennan,	"	"	" 203
J. Redmond,	"	"	" 233
C. Paine,	"	"	" 284
G. Wagner,	"	"	" 289
J. Park,	"	"	" 297
J. B. Stewart,	"	"	" 301
H. J. Corbus,	"	"	" 318
J. Stephenson,	"	"	" 342
M. Wagner,	"	"	" 379
F. A. Briggs,	"	"	" 392

are reported herewith, and the following schedule showing my calculations:

SCHEDULE.

Michigan Southern & Northern Indiana Railroad Company.

Number of rails repaired as per statement of defendant from September 9, 1856, to February 28, 1858	20,000 bars.
Repaired for year ending February 28, 1859	49,853 "
" " " " " " 1860	49,202 "
" " " " " " 1861	46,795 "
" " " " " " 1862	47,000 "
" " " " " " 1863	53,596 "
" " " " " " 1864	50,666 "
" " " " " " 1865	57,021 "
" " " " " " 1866	52,417 "
" " " " " " 1867	66,898 "
265 Repaired for year ending February 28, 1868	64,554 bars.
" " " " " " 1869	69,438 "
18 months to December 31st, 1869	57,869 "
Total number of rails	687,219 "
Deduct $\frac{1}{6}$ for cut rails	114,536 "
Balance	572,682 "
Estimating 18 inches per rail	=859,023 feet.
At 48 cents per foot	=$412,331.04

From which I find and report that there is due to the complainant

from this defendant the sum of $412,331.04, (four hundred and twelve thousand three hundred and thirty-one $\frac{04}{100}$ dollars.)

THE PITTSBURGH, FORT WAYNE & CHICAGO RAILWAY COMPANY.

There was evidence submitted upon the part of this defendant tending to show that in the estimation of the officers of the company the annual reports which were furnished me upon the former hearing were not enough, of themselves, to enable me to fix upon the number of rails repaired by the defendant on the complainant's machine, as the reports returned the number of miles repaired in some years, and for other years the number of tons, but do not state the number of rails, or show what were repaired by the infringing machines, and by other methods.

In fixing the amount due before, I did not rely entirely upon these reports, and I do not do so now.

266 I have taken the answer of the defendant in connection with the testimony of the following witnesses called by complainant and defendant:

S. Lawler, defendants' record	page	
" complainant's "	"	216
O. Hooper, defendants' "	"	98
H. Cooper " "	"	87
J. Ginien, complainant's "	"	218
J. Fitzgibbon, defendants' "	"	87

all of whom were employed by the defendant during the period covered by the account. As to the number of rails repaired on machines adjudged to be infringements, between the 26th (twenty-sixth) day of November, 1861, and the 1st (first) day of July, 1869, 106,980 rails at an average of 14 inches per rail, or 124,810 feet, which, at 48 cents per foot, is $59,908.80.

I therefore find and report that there is due to the complainant from this defendant the sum of $59,908.80, (fifty-nine thousand nine hundred and eight $\frac{80}{100}$ dollars.)

THE CHICAGO, BURLINGTON & QUINCY RAILWAY COMPANY.

Upon the part of this defendant no evidence has been submitted to me as to the amount of work done upon the complainant's machine, or tending to show that any error was made by me in my former conclusions in this respect; nor is it claimed that the amount found due from this defendant was not a correct one, except so far as the evidence of the saving per foot applies to it, in common with the other defendants.

I have therefore only made, in this case, the deduction proportionate to the decrease in the saving per foot, as compared with my former finding.

267 The annual reports of this road were withdrawn after my first report was prepared, and I cannot, therefore, annex a schedule showing the details of that finding.

Deducting, as above stated, I find and report that there is due the complainant from this defendant the sum of $61,501.90, (sixty-one thousand five hundred and one $\frac{92}{100}$ dollars.)

I herewith report to the court, in pursuance of its order, to be filed herewith, all of the testimony offered by the complainant and defendants under the orders of the court herein, and made use of by me in the preparation of this report; and on the 8th day of May inst. I notified

the solicitors of the respective parties that I would, on the following day, file with the court my report in these causes.

All of which is respectfully submitted.

(Signed) HENRY W. BISHOP,
Master in Chancery, etc.

Dated May 9, 1874.

269, 270 And afterwards, to wit, on the sixth day of June, A. D. 1874, the defendant, by its solicitors, come and file their exceptions to the report of the master in the words & figures following, to wit:

271 United States circuit court, northern district of Illinois.

SAMUEL H. TURRILL
v.
THE ILLINOIS CENTRAL RAILROAD COMPANY et al. } In chancery.

SAME
v.
THE CHICAGO, BURLINGTON & QUINCY RAILROAD COMPANY et al. } In chancery.

SAME
v.
THE MICHIGAN SOUTHERN & NORTHERN INDIANA RAILROAD COMPANY et al. } In chancery.

SAME
v.
THE CHICAGO & ALTON RAILROAD COMPANY et al. } In chancery.

SAME
v.
THE PITTSBURGH, FORT WAYNE & CHICAGO Railway Company. } In chancery.

Exceptions to the master's report.

Exceptions taken by defendants to the report made herein by H. W. Bishop, esq., master in chancery of this court, and filed May 9th, 1874, under the interlocutory decree of November 7th, 1873.

272 I.

AS TO THE SAVING PER FOOT.

1. For that the said master has not reported the cost per foot of mending rails on the "swage-block," and on the machines used by defendants, and adjudged to be infringements, though expressly directed by said decree so to do.

2. For that the method in fact adopted by said master for estimating the amount of work done on said several machines is not only in conflict with the order of the court, but is in itself erroneous and unjust.

3. For that the said master has based his said estimate on the testi-

mony of some five or six witnesses out of over one hundred, and rejected all the rest.

4. For that the said master has based his said estimate solely on the testimony of those witnesses who present accounts, totally disregarding all other testimony.

5. For that, while professing to adopt this method, he has not even included in his said estimate all those witnesses who have presented accounts.

6. For that he has adopted, as the sole basis of his estimate of the amount of work done on the "Cawood machine," an account not kept by the witness who produced it, not relating to any one of the defendants' roads, and covering only the space of two months.

7. For that he has, in making said estimate, totally rejected the testimony of the following witnesses, as to the amount of work that can be done on the "swage-block," viz, Lewis, Lebart, Davis, Harris, Ham, Wilson, Anderson, Erickson, and Sampson, and others.

273 8. For that he has totally rejected the testimony of the following witnesses as to the amount of work that can be done on the Cawood, viz, Howe, Hooper, Benedict, Flavan, Brennan, Redmond, A. Reed, White, Wagner, Park, J. B. Stewart, Lee, Graves, Quade, and others.

9. For that he has, as he expressly states, totally rejected that portion of the testimony which is based on a comparison between the two machines, and which directly asserts that no more work can be done on the "Cawood" than on the "swage-block."

10. For that he has thus rejected the testimony on this point of the following witnesses, viz, Heywood, Hassett, Davis, Shaw, Corbus, Wieber, Warren, Lewis, Ham, Errickson, Mullen, Lebart, Humphreys, Sampson, G. Wagner, M. Wagner, and Collins.

11. For that, in estimating said saving, said master has wholly rejected that portion of the testimony that shows directly the cost of mending on the "swage-block" and on the "Cawood."

12. For that he has thus rejected the testimony on this point of the following witnesses, viz, Stone, Maxwell, Hoyt, Buckhout, E. M. Reed, Heywood, Oliver, Eccles, L. H. Clark, Davis, Harris, Ham, Anderson, Shaw, Collins, Turner, Conrad, J. T. Clark, Hjortsberg, Booth, McMullin, and others.

13. For that the said master has reported that the profit to the defendants by repairing rails upon the complainant's machines was 48 cents per foot, or far in excess of what is shown by the evidence.

14. For that the said master has reported the lowest rate of wages paid by any of the defendants at any period at $5.45;
274 whereas the evidence shows that it was only $3.30 on the Illinois Central, and $5.05 on the Pittsburgh & Fort Wayne.

15. For that he has reported that no means have been afforded him from the testimony to make several findings against the defendants as to this question of saving; whereas the evidence shows a wide difference in this respect.

16. For that the said master, in estimating the saving by said defendants, by the use of said so-called "Cawood" machines, has based his finding mainly, if not solely, on evidence as to what was done on other roads; whereas there was abundant evidence in the case, showing directly what had been in fact done by said defendants on their own road.

17. For that whereas much evidence was taken in regard to what was done by other parties for the purpose of showing that said patented

device was new and useful; but which evidence was wholly inadmissible and impertinent for the purpose of proving what gains and profits had been made by the defendants, or either of them, by the use of said device; yet the said master has based his estimate of the said gains and profits mainly on said evidence.

18. For that the master, in determining the alleged saving by the use of said so-called "Cawood" machines, did not take into consideration but rejected all evidence tending to show that there was no benefit or profit in such use of said machines, or in the mending of rails therewith; whereas such evidence is admissible, and ought to be considered in determining the measure of damages and for the purpose of reducing such damages to a nominal sum.

19. For that, as shown by the evidence, a large proportion of
275 the mending done by said defendants was by short patches at the end of the rails, and that such repairs could be made as well and as cheaply by the use of the "swage-block" as by said "Cawood" machine; whereas said master, in his said report, has charged against said defendants a profit at the rate of 48 cents a foot for all such patches.

20. For that it was proven by sufficient, competent, and uncontradicted evidence that during all the time covered by said report it was reasonably practicable to accomplish nearly or quite as much mending with the "swage-block" as with the said "Cawood" machine, and at very little or no greater cost; whereas said master has reported that the cost of mending on the "swage-block" exceeded the cost of mending on the "Cawood" by more than 100 per cent.

21. For that said master has assumed, and in effect found in his said report that the smallest number of inches showed to have been repaired per day by said defendants by the use of said so called "Cawood" machines was 240; whereas the evidence as to the repairs of rails by said defendants on said machines shows that the average number of inches so repaired per day did not exceed 144.

22. For that said master has assumed, and in effect found and reported, that the lowest average number of inches repaired per day by said defendants on said so called "Cawood" machines was 240, and that there was a profit to said defendants, by the use of said device, of 48 cents per foot, or $9.60 per day; whereas, according to the evidence, the average number of inches so repaired by said defendants per day did not exceed 144; and, by the uncontradicted evidence of Lewis, Lebart, Ham, and many other witnesses, it is shown that during all the time of the use by said defendants of said device it was reason-
276 ably practicable to repair an equal or greater number of inches per day with the "swage-block," and equally well and at no greater cost; such method of repairing rails being, during all that time, well known and in common use.

In behalf of the Pittsburgh, Fort Wayne & Chicago Road.

23. For that the said master has erred in stating that no argument was made before him in relation to the price of coals on the different roads defending.

24. For that the said master has erred in charging the same amount for coal on the Pittsburgh, Fort Wayne & Chicago Road that he has charged upon the other roads.

25. For that the said master, totally without proof, has estimated coal at 45 cents per 100 pounds, which can be procured on the said road at from 10 to 12 cents per 100 pounds.

II.

AS TO NUMBER OF RAILS REPAIRED.

In behalf of the Chicago & Alton, and Pittsburgh, Fort Wayne and Chicago Roads.

26. For that the said master has not shown in what way he estimated the number of rails found by him to have been repaired by said defendants respectively, nor given the data on which he has based his said estimate.

In behalf of the Illinois Central, Michigan Southern & Northern Indiana, and Pittsburgh, Fort Wayne & Chicago Roads.

27. For that he has charged said defendants respectively with a large number of rails repaired prior to the date when said complainant became the owner of said patent.

277 *In behalf of the Chicago & Alton Road.*

28. For that the said master has charged said defendant with a total of 134,170 rails repaired; which is some 6,000 rails in excess of the actual number, as shown by the evidence.

29. For that he has deducted from this total number of repaired rails only one-sixth for rails cut off and otherwise repaired without using the jaws; whereas the proportion was much larger than that, as shown by the testimony of the following witnesses, viz, Cornell, W. P. Lee, Huskinson, Flavan, McCormick, Henry A. Reed, White, Rooney, McMullin, P. Lee, Graves, Blackstone, and Rowe; from which it appears that the proportion of rails so cut off and otherwise mended was one-third.

In behalf of the Michigan Southern & Northern Indiana Road.

30. For that the said master has charged this defendant with a total of 687,219 rails repaired; which is far in excess of the number properly chargeable, as shown by the evidence.

31. For that he has deducted from this total only one-sixth for rails cut off and otherwise repaired without using the jaws; whereas the proportion was much larger than that and not less than 30 per cent. of the whole number, as appears from the testimony of Pool, Brennan, Redmond, Park, J. B. Stewart, Corbus, and others.

In behalf of the Pittsburgh, Fort Wayne & Chicago Road.

32. For that the said master has charged this defendant with a total of 106,980 rails repaired, without any evidence to warrant said finding.

278 33. For that he has made no deduction from said total on account of rails cut off or otherwise mended without using the jaws.

34. For that the said master has erred in stating that the answer of the Pittsburgh, Fort Wayne & Chicago Railway Company in any way showed the number of rails repaired on machines adjudged to be infringements, and has, therefore, erred in his calculation based thereon.

III.

AS TO THE AVERAGE LENGTH OF MEND PER RAIL.

In behalf of the Michigan Southern & Northern Indiana, and the Chicago & Alton Roads.

35. For that the said master, in estimating the number of rails cut off and otherwise mended without the use of the jaws, by said defendants, has relied solely on evidence relating to the Illinois Central Road, disregarding the evidence as to what was in fact done by said defendants.

36. For that the said master has not shown in what way he estimated the length of mend per rail, nor given the data on which he has based his said estimate.

In behalf of the Chicago & Alton Road.

37. For that the said master has reported that the average mend per rail on this road was twelve inches; whereas seven or eight inches is the utmost that could fairly be charged against it, as appears from the evidence of Cornell, W. P. Lee, Huskinson, Flavan, McCormick, Henry A. Reed, White, Rooney, McMullin, Graves, Blackstone, Rowe,
279 Howe, Booth, Reeve, and others, the printed reports, and the personal observation of the master.

38. For that the said master in determining the length of mend has apparently made no use of said printed reports furnished by said defendant.

In behalf of the Michigan Southern & Northern Indiana Road.

39. For that the master has reported that the average length of mend per rail by said road was eighteen inches; whereas, according to the evidence, it did not exceed ten or twelve inches per rail.

In behalf of the Pittsburgh, Fort Wayne & Chicago Road.

40. For that the said master has erred in point of fact in his estimate of the average patch made upon the rails on said Pittsburgh, Fort Wayne & Chicago Railway Company, fixing the same at 14 inches per rail; the proof being conclusive that the average patch was six inches.

IV.

GENERALLY.

41. For that the said master has charged the said defendants with the full amount of the saving found by him to have been effected by the use of the so-called infringing machines; whereas the defendants deny that they are properly chargeable with said amount, or that said saving is the proper measure of damages in these cases.

42. For that the said master has failed to identify, specify, or refer to the several depositions, examinations, or answers brought in or
280 used before him, so as to inform the court what depositions, examinations, or answers were so brought in or used.

43. For that the said master, when stating the grounds on which he

came to his conclusion as to the saving per foot, has not stated the evidence whence he deduced said grounds.

In each and all of which particulars said defendants except to the said report of the said master as erroneous, and appeal therefrom to the judgment of this honorable court.

281, 282 And afterwards, to wit, on the 6th day of June, A. D. 1874, the complainant, by his solicitors, comes and files his exceptions to the master's report, in the words & figures following, to wit:

Exception taken by the complainant to the report made herein by Henry W. Bishop, esq., one of the masters of this court, to whom these cases were referred by a decree herein made and entered on the seventh day of November, 1873, which report bears date October 22, 1873.

1st. In that the said master has found, and so reported, that the profit to the several defendants from repairing rails upon the complainant's machine was forty-eight cents per foot, instead of sixty-one and one-half cents per foot, which the evidence reported by the said master, and referred to by him, shows to have been the amount of their actual profit.

2d. In that the said master, in stating the account of profits made by the Illinois Central Railroad Company, has deducted from the entire number of rails returned to him by said defendants as mended
283, 284 upon the complainant's machine, one-sixth part as having been cut off at the end and not mended on the complainant's machine; whereas it appears in and by the said report that while rails were cut off at the end at some of the shops of the defendants which might have been included in the account rendered to him as having been repaired on the complainant's machine, it does not appear, and the master does not find, that they were in fact so included in said statement; and therefore it does not appear that any deduction should be made therefor, or how many, if any, should be deducted.

3d. In that the said master, in stating the accounts of profits made by the Chicago & Alton Railroad Company from the use of the complainant's machine, has deducted from the number of rails returned to him by said defendants as mended upon the complainant's machine one-sixth part as having been cut off at the end and not mended upon the complainant's machine; whereas the said master has stated in his report that he is not able to determine the proportion of rails so cut
285, 286 off, yet proceeds to fix upon the said proportion and to allow the same to the defendant.

4th. In that the said master, in stating the accounts of the profits made by the said Chicago & Alton Railroad Company from the use of the complainant's machine, had made no allowance for rails shown by the evidence to have been repaired by said defendants upon the complainant's machine at their shops at Summit from June 1, 1861, to June 1, 1865.

5th. In that the said master, in stating the account of profits made by the Michigan Southern and Northern Indiana Railroad Company from the use of the complainant's machine, has deducted from the number of rails returned to him by the said defendants as mended upon the complainant's machine one-sixth part as having been cut off at the end and not mended upon the complainant's machine, upon evidence which he states in said report to be of substantially the same character as that offered by the Chicago & Alton Railroad Company referred to in the third exception.

287, 288 6th. In that the said master has found, and so reported, that

the average amount of mending per rail upon the complainant's machine by said Michigan Southern and Northern Indiana Railroad Company was eighteen inches, instead of twenty-four inches, which the evidence reported and referred to by said master shows to have been the average amount per rail mended by said defendants.

In each and all which particulars the complainant excepts to the report of said master as erroneous, and appeals therefrom to the judgment of this honorable court.

WALTER CURTIS,
For Complainant.

(Endorsed:) Filed June 6, 1874. Wm. H. Bradley, clerk.

289, 290 And afterwards, to wit, on the seventh day of July, one thousand eight hundred and seventy-four, in the record of the proceedings of said court is the following entry, to wit:

SAMUEL H. TURRILL
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY et al. } In chancery.

Now come the parties, by their solicitors, and by consent of all parties, the exceptions to the master's report are now set down for hearing as though the same had been formally taken before the master and by him certified to the court; and, after hearing the arguments of counsel in part, the further hearing of the same is postponed until to-morrow morning.

And afterwards, to wit, on the eighth day of July, one thousand eight hundred and seventy-four, in the record of the proceedings of said court is the following entry, to wit:

291, 292 SAMUEL H. TURRILL
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY et al. } In chancery.

Now come again the parties, by their solicitors, and, after further hearing arguments of counsel upon exceptions to master's report, the further hearing of the same is postponed until to-morrow morning.

And afterwards, to wit, on the ninth day of July, one thousand eight hundred and seventy-four, in the record of the proceedings of said court, is the following entry, to wit:

SAMUEL H. TURRILL
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY et al. } In chancery.

Now come again the parties, by their solicitors, and, after hearing the concluding arguments of counsel upon the exceptions to
293, 294 the master's report, the court not being now sufficiently advised in the premises, takes time to consider.

And afterwards, to wit, on the sixteenth day of July, one thousand eight hundred and seventy-four, in the record of the proceedings of said court, is the following entry, to wit:

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL RAILROAD COMPANY et al. } In chancery.

Now comes the said defendant, by its counsel, and asks leave of the court to file an amendment to its original answer; and, no objections being made thereto, the same is allowed by the court.

And thereupon, on the same day, the said defendant files the following amendment to its original answer, which is in the words and figures following, to wit:

295, 296 United States circuit court for the northern district of Illinois.

SAMUEL H. TURRILL
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY. } In chancery.

The amended answer of The Illinois Central Railroad Company, defendant, to the bill of complaint of Samuel H. Turrill, complainant.

This defendant, further answering, by way of amendment to its former answer heretofore filed in said cause by leave of court first had and obtained, says:

That in its said original answer, it is stated as follows: "And these defendants further state the amount of work, as near as they have been able to ascertain the same, done on said machines in the shops of the Illinois Central Railroad, commencing with the year 1860, and
297, 298 ending in August, A. D. 1868, as shown in and by the following tabular statement, to wit:" (Here followed the statement.)

"From which statement it appears that during the time mentioned, there were mended upon the machines so put up as aforesaid in the shops of this defendant, The Illinois Central Railroad Company, one hundred and fifty-seven thousand four hundred and ninety-two bars, (157,492.")

That said defendant, by way of amendment to said portions of said answers, further answering, says: that in the reports kept by the employees of said company all rails were included under the head of "repaired" rails, or "mended" rails, that had anything done to them, whether they were actually patched on the top or only cut off, or straightened or mended on the flange; that when the said defendant furnished the counsel an account of rails repaired, to be by him incorporated in its said answer, this distinction was wholly lost sight of, and hence it followed that all the rails mended by said company
299, 300 during the period mentioned in said answer were returned and included in said answer as rails mended on said machines; whereas the fact was and is that a large proportion of said rails, equal to one-sixth, or upwards, of the whole number of the said rails stated in said answer, and of those since mended by the defendant, were simply cut off or straightened, or mended on the flange, without being patched in said machines at all, as appears from the testimony since taken and now on file in said cause, and as this defendant verily believes to be the case, not including in the above estimate such rails as have been mended by said defendant on the Banies rolls.

And this defendant therefore insists that there should be deducted

from the said number of rails, so stated in its said original answer, one-sixth or upwards, as not repaired or mended on said so called infringing machines.

And this defendant, further answering, says that the said John
301, 302 W. Douglass, by whom said former answer was signed & sworn, has long since ceased to be the president of said company.

ILLINOIS CENTRAL RAILROAD COMPANY,
By JOHN NEWELL, *President.*

STATE OF ILLINOIS,
County of Cook, City of Chicago, ss:

John Newell, being first duly sworn, deposes and says that he is the president of the corporation above-named as defendant; that he knows the contents of the above amended answer, and that the matters and things therein stated, as of the knowledge of the said defendant, are true, and as to those therein stated upon information and belief, he believes them to be true.

JOHN NEWELL, *Pres't.*

Subscribed and sworn to before me this 16th day of July, A. D. 1874.
[SEAL.] PETER DAGGY,
Notary Public.

303, 304 (Endorsed:) Filed July 16, 1874. Wm. H. Bradley, clk.

And afterwards, to wit, on the said sixteenth day of July, one thousand eight hundred and seventy-four, in the record of the proceedings of said court is the following entry, to wit:

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL RAILROAD COMPANY AND John M. Douglas. } In chancery.

And now, at this day, the court being sufficiently advised upon the exceptions heretofore filed on the part of the complainant, as well as of the defendants, sustains all exceptions of the defendants to the master's report, which object to the amount of profits and the measure thereof, made by the defendants, by the use of the complainant's machine,
305, 306 and also sustains all the exceptions of the defendants which object to the allowance by the master of profits for the use of the complainant's machine by the defendants, before the complainant had title to the patent or any part or interest therein. And as to all other exceptions of the defendants to the master's report the court overrules the same; and the court overrules the exceptions of the complainant to the master's report.

And the court being of opinion that the case should not be again referred back to the master, but that the court should find the amount of profits which the defendants have respectively made by the use of the complainant's machine, doth find the same to be the sum of ninety-one thousand nine hundred and eighty dollars and thirty-three cents.

It is thereupon ordered and decreed that the said defendant, the Illinois Central Railroad Company, pay to the said complainant the sum of ninety-one thousand nine hundred and eighty dollars and thirty-
307, 308 three cents so as aforesaid found within thirty days from the date of this decree, and in default thereof that execution issue therefor. And it is further ordered that the said Illinois Central Railroad Company pay all the costs to be taxed herein.

And afterwards, to wit, on the sixteenth day of July, one thousand eight hundred and seventy-four, in the record of the proceedings of said court, is the following entry, to wit:

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL RAILROAD COMPANY et al. } In chancery.

Now comes the said defendant, by its counsel, and asks leave of the court to file an amendment to its original answer; and, no objections being made thereto, the same is allowed by the court.

And thereupon, on the same day, the said defendant files the following amendment to its original answer, which is in the words and figures following, to wit:

295, 296 United States circuit court for the northern district of Illinois.

SAMUEL H. TURRILL
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY. } In chancery.

The amended answer of The Illinois Central Railroad Company, defendant, to the bill of complaint of Samuel H. Turrill, complainant.

This defendant, further answering, by way of amendment to its former answer heretofore filed in said cause by leave of court first had and obtained, says:

That in its said original answer, it is stated as follows: "And these defendants further state the amount of work, as near as they have been able to ascertain the same, done on said machines in the shops of the Illinois Central Railroad, commencing with the year 1860, and
297, 298 ending in August, A. D. 1868, as shown in and by the following tabular statement, to wit:" (Here followed the statement.)

"From which statement it appears that during the time mentioned, there were mended upon the machines so put up as aforesaid in the shops of this defendant, The Illinois Central Railroad Company, one hundred and fifty-seven thousand four hundred and ninety-two bars, (157,492.")

That said defendant, by way of amendment to said portions of said answers, further answering, says: that in the reports kept by the employees of said company all rails were included under the head of "repaired" rails, or "mended" rails, that had anything done to them, whether they were actually patched on the top or only cut off, or straightened or mended on the flange; that when the said defendant furnished the counsel an account of rails repaired, to be by him incorporated in its said answer, this distinction was wholly lost sight of, and hence it followed that all the rails mended by said company
299, 300 during the period mentioned in said answer were returned and included in said answer as rails mended on said machines; whereas the fact was and is that a large proportion of said rails, equal to one-sixth, or upwards, of the whole number of the said rails stated in said answer, and of those since mended by the defendant, were simply cut off or straightened, or mended on the flange, without being patched in said machines at all, as appears from the testimony since taken and now on file in said cause, and as this defendant verily believes to be the case, not including in the above estimate such rails as have been mended by said defendant on the Banies rolls.

And this defendant therefore insists that there should be deducted

from the said number of rails, so stated in its said original answer, one-sixth or upwards, as not repaired or mended on said so called infringing machines.

And this defendant, further answering, says that the said John
301, 302 W. Douglass, by whom said former answer was signed & sworn, has long since ceased to be the president of said company.

ILLINOIS CENTRAL RAILROAD COMPANY,
By JOHN NEWELL, *President.*

STATE OF ILLINOIS,
County of Cook, City of Chicago, ss:

John Newell, being first duly sworn, deposes and says that he is the president of the corporation above-named as defendant; that he knows the contents of the above amended answer, and that the matters and things therein stated, as of the knowledge of the said defendant, are true, and as to those therein stated upon information and belief, he believes them to be true.

JOHN NEWELL, *Pres't.*

Subscribed and sworn to before me this 16th day of July, A. D. 1874.
[SEAL.] PETER DAGGY,
Notary Public.

303, 304 (Endorsed:) Filed July 16, 1874. Wm. H. Bradley, clk.

And afterwards, to wit, on the said sixteenth day of July, one thousand eight hundred and seventy-four, in the record of the proceedings of said court is the following entry, to wit:

Fin'l Decree

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL RAILROAD COMPANY AND John M. Douglas. } In chancery.

And now, at this day, the court being sufficiently advised upon the exceptions heretofore filed on the part of the complainant, as well as of the defendants, sustains all exceptions of the defendants to the master's report, which object to the amount of profits and the measure thereof, made by the defendants, by the use of the complainant's machine,
305, 306 and also sustains all the exceptions of the defendants which object to the allowance by the master of profits for the use of the complainant's machine by the defendants, before the complainant had title to the patent or any part or interest therein. And as to all other exceptions of the defendants to the master's report the court overrules the same; and the court overrules the exceptions of the complainant to the master's report.

And the court being of opinion that the case should not be again referred back to the master, but that the court should find the amount of profits which the defendants have respectively made by the use of the complainant's machine, doth find the same to be the sum of ninety-one thousand nine hundred and eighty dollars and thirty-three cents.

It is thereupon ordered and decreed that the said defendant, the Illinois Central Railroad Company, pay to the said complainant the sum of ninety-one thousand nine hundred and eighty dollars and thirty-
307, 308 three cents so as aforesaid found within thirty days from the date of this decree, and in default thereof that execution issue therefor. And it is further ordered that the said Illinois Central Railroad Company pay all the costs to be taxed herein.

And it is further ordered that the said Illinois Central Railroad Company, its servants and agents, be perpetually enjoined and restrained from making or using any machine for repairing railroad-bars embracing the improvement, or any substantial part thereof, for which letters-patent were issued to Joseph D. Cawood.

And it is further ordered that this suit be dismissed as against John M. Douglas.

And thereupon the defendant prays an appeal to the Supreme Court, which is allowed, upon filing bond in the penal sum of one hundred and ten thousand dollars, with surety to be approved by the court, said bond to be filed within days.

309, 310 And afterwards, to wit, on the 16 day of July, A. D. 1874, the following certificate of the evidence used on the trial of said cause was filed in the office of the clerk of said court.

311, 312 United States circuit court for the northern district of Illinois, in the seventh circuit.

SAMUEL H. TURRELL
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY and JOHN M. DOUGLAS. } In chancery.

And in other cases, as per stipulation between the parties.

Evidence for the record to the United States Supreme Court.

1. The stipulation concerning testimony and Turrill's title, dated Chicago, 6th July, 1869.

2. Letters-patent No. 15687, granted to Joseph D. Cawood, dated 9th September, 1856.

3. The record and judgment in the suit at law in the United States circuit court for the northern district of Illinois between Samuel H. Turrill and Charles Wormley, plaintiffs, and the Illinois Central
313, 314 Railroad Company, defendant, as follows: The declaration, filed 9th July, 1861; the plea, filed 7th October, 1867; notices of special matter in defence, filed 6th April, 1865; the stipulation waiving a jury, dated 24th October, 1867; the judgment, dated 8th November, with the endorsement thereon; the mandate of the U. S. Supreme Court, dated 16th November, 1869; the mandate of the U. S. circuit court, dated 11th December, 1869; the execution, with endorsement of satisfaction thereon, dated 13th December, 1869; the clerk's certificate to the above papers, and matters of record.

4. The testimony of the following-named witnesses for the complainant: Edward S. Renwick, Richard Sinclair, Maxwell Cornelius, Henry Waters, (taken before N. A. Parks, N. P.;) Kinsman A. Huntoon, Eli H. Perkins, Joseph W. Smith, Alvin A. Stone, Henry Foster, James Monk, Andrew Maxwell, Philip Hanselling, John McCormick, Peter Worrall, Greenough McQuestion, Daniel Rooney, Richard Colford,
315, 316 Isaac G. Howe, Jonathan Clemons, John C. Ragland, James M. Greenwood, William T. Ragland, (taken before P. C. Hoyne, comr.;) James Connor, John H. Lakey, William Sheard, M. Pearson, Devillo L. Harkness, Alexander Snodgrass, Balser Christner, Leverett H. Clark, Jeremiah Donelly, Philip Christner, Matthew McMillen, Peter A. Craig, Samuel Lawler, Charles C. Dodge, John Genier, and Frederick Marker, J. B. Illingsworth, William T. Ragland, (taken before H. W. Bishop, comr.;) Henry Waters, (taken before H. W. Bishop, comr.)

5. The testimony of the following-named witnesses for the defendants: Edward Greenleaf, (taken before E. A. Davis, comr.;) William C. Hib-

bard, Edward Greenleaf, (taken in open court in Chicago;) Shaw Stewart, William Sheard, taken before E. A. Davis, comr.;) Michael Lawler, William Sheard, (taken in open court;) James Ryan, Luke Pratt, John Cooley, Peter Worrell, Henry G. Wallace, Francis C. Treadwell, Daniel Ferenbeck, William F. Dorsett, Henry B. Renwick, Thomas White, James Flavan, Henry Cooper, William Cullon, James Box, Frank Fitzgibbon, Albert Congdon, O. A. Simons, Isaac Hooper and Samuel Lawler, William Benedict, Edward Greenleaf, (taken in open court at Detroit.)

317, 318 6. The testimony of the following-named witnesses for the defendants concerning the accounting: John M. Toucey, William H. Russell, William C. Hibbard, James M. Hoyt, Horace A. Alden, William C. Hicks, J. C. Buckhout, William Mullen, L. H. Clarke, Edward M. Reed, David Hassett, Max Hiortsberg, Samuel Nott, Joseph R. Conrad, Thomas M. Blair, Charles L. Heywood, William Callon, James Walker, Charles S. Turner, William Benedict, James Redmond, Moses F. Warren, Robert Eccles, Dennis Brennan, Moses W. Oliver, John Boyd Eliot, James T. Clark.

7. The testimony of the following-named witnesses for the defendants, taken before the master, November, 1873: W. B. Ainsworth, E. Errickson, Eben Lebart, Horatio Anderson, (with exhibits;) James Flavan, Patrick Lee, J. T. Barnet, John Fletcher, William P. Lee, T. B. Blackstone, Otis Graves, Horatio Lewis, K. F. Booth, Charles T. Ham, John McCormick, Dennis Brennan, Daniel L. Harris, (with exhibits;) James C. McMullin, F. A. Briggs, James M. Healey, L. P. Morehouse, Charles Collins, (with exhibits;) William E. Henry, Charles Paine, H. J. Corbus, Robert Y. Humphreys, James Park, N. Cornell, William Hoskinson, (with exhibits;) Joseph Poole, David S. Davis, John B. Jervis, James Redmond, Andrew Reed, John Stephenson, K. F. Booth,

319, 320 Nathan Reeve, John B. Stewart and F. M. Hutchinson, Dan. Rooney, George Wagner, David Rowe, Michael Wagner, John Sampson, Thomas White, Albert T. Shaw, John J. Wieber, Oscar A. Simons, Charles Wilson.

8. The testimony of the following-named witnesses for the complainant, taken before the master, in rebuttal, December, 1873: Michael Arnold, George Lounsberry, Thomas M. Rippon, William Costigan, L. J. Morehouse, David H. Williams, William Flynn, Jerry Quaid and Thomas E. Workman, John H. Lakey, William T. Ragland.

9. The lease by the Pittsburgh, Fort Wayne and Chicago Railway Company to the Pennsylvania Railroad Company, dated 7th of June, A. D. 1869.

10. All other letters-patent, models, reports, and exhibits produced and used in the circuit court in these causes may be produced, referred to, and used on the hearing in the Supreme Court, with the same privilege and effect as if each and all of them were made a part of this record.

321, 322 July 16, 1874.

JNO. N. JEWETT,
Sol'rs for Deft.
AYER & KALES,
Sol'rs for the Complainant.
GEORGE PAYSON,
Dfts. Solicitor and of Counsel.
THOMAS DRUMMOND,
Circuit Judge.

(Endorsed:) Filed July 16, '74. Wm. H. Bradley, clk.

And afterwards, to wit, on the seventeenth day of September, A. D. 1874, said defendant, by its solicitors, came and filed in the office of said clerk its bond in appeal, which said bond is in the words and figures following, to wit:

Know all men by these presents, that we, the Illinois Central Railroad Company, E. Buckingham, and C. P. Buckingham, are held and firmly bound unto Samuel H. Turrill, in the full and just sum of one hundred and ten thousand (110,000) dollars, to be paid to the said Sam-
323,324 uel H. Turrill, his certain attorney, executors, administrators, or assigns, to which payment, well and truly to be made, we bind ourselves, our successors, heirs, executors, administrators, jointly and severally, by these presents.

In witness whereof the said The Illinois Central Railroad Company has caused these presents to be signed by its president, and its corporate seal to be hereto affixed, and the said E. Buckingham and C. P. Buckingham have here set their hands and seals, this twenty-fifth day of July, A. D. 1874.

Whereas lately, at a term of the United States circuit court for the northern district of Illinois, in a suit depending in said court, on the chancery side thereof, between the said Samuel H. Turrill, complainant, and the said Illinois Central Railroad Company and John M. Douglas, defendants, a decree was rendered against the said Illinois Central Railroad Company for the sum of ninety-one thousand nine hun-
325,326 dred and eighty dollars and thirty-three cents and costs.

And whereas the above-bounden The Illinois Central Railroad Company has taken an appeal to the Supreme Court of the United States to reverse the said decree:

Now, therefore, the condition of this obligation is such that if the above-named The Illinois Central Railroad Company shall prosecute its said appeal to effect and answer all damages and costs if it shall fail to make its appeal good, then this obligation shall be void; otherwise to remain in full force and virtue.

THE ILLINOIS CENTRAL RAILROAD COMPANY,
By JOHN NEWELL, *President.* [SEAL.]

Sealed and delivered in presence of—

Witness:
HENRY D'WOLF.

E. BUCKINGHAM. SEAL.]
C. P. BUCKINGHAM. [SLAE.]

Witness:
B. MOE.

JOSEPH F. TUCKER,
Attest to Seal.

327,328 Approved:

THOMAS DRUMMOND.

(Endorsed:) Filed Sept. 17, '74. Wm. H. Bradley, clk.

329,330

331, 332 *Complainant's proofs.*

333, 334 SAMUEL H. TURRILL *vs.* ILLINOIS CENTRAL RAILROAD COMPANY AND John M. Douglas.	Circuit court of United States, northern district of Illinois. In chancery.
SAMUEL H. TURRILL *vs.* CHICAGO, BURLINGTON AND QUINCY RAILroad Company and Amos T. Hall.	Same court. In chancery.
SAMUEL H. TURRILL *vs.* MICHIGAN SOUTHERN AND NORTHERN INDIANA Railroad Company and E. B. Phillips.	Same court. In chancery.
SAMUEL H. TURRILL *vs.* CHICAGO AND ALTON RAILROAD COMPANY AND T. B. Blackstone.	Same court. In chancery.
SAMUEL H. TURRILL *vs.* PITTSBURG, FT. WAYNE AND CHICAGO RAILroad Company, etc.	Same court. In chancery.

Stipulation.

It is hereby stipulated and agreed by and between the said several parties in each of the suits aforesaid that said parties, complainant and defendant, or either of them, may, on any trial touching the matters in controversy between said parties, read in evidence, with the same force and effect as if taken in each of said suits by commission under the laws of the United States, the following, that is to say:

335 The depositions of J. B. Illingsworth, Matthew McMillen, Samuel Lawler, John Genier, William Sheard, Andrew Maxwell, Maxwell Cornelius, Artemus Ward Eggleston, Peter Worrell, John C. Ragland, Michael Fesler.

Also the following, viz: Copy of testimony of Kinsman A. Huntoon, Alexander Snodgrass, Jeremiah Donnelly, Emery O. Crittenden, Alvin A. Stone, Richard Colford. All the foregoing depositions and copies being on file in the case of the said Samuel H. Turrill and one Wormley vs. The Illinois Central Railroad Company, lately pending in the said circuit court of the United States, on the law side thereof.

Also the following, viz: The testimony of John Leach, James Harris, and Walter Thompson, referred to in the stipulations of May the 13th and 16th, 1865, made by Mr. Jewett in the case of said Turrill, etc., vs. Michigan Southern and Northern Indiana Railroad Company, tried at Detroit June and July, 1865, which said testimony is found in the reporter's minutes.

Also the following, viz: The testimony of Robert Armstrong, Edward Shannon, Samuel Amler, John Terrence, and Alhira Etheridge, as found and contained in the reporter's minutes of their testimony, at the trial of said suit against the said Michigan Southern Railroad Company, in 1865, and at the trial of said suit at law of said Turrill and Wormley vs. Illinois Central Railroad Company, in this court in 1867. All of

which evidence and testimony foregoing was used and taken on the part of said Turrill and Wormley in said suit at law vs. The Illinois Central Railroad Company.

Also the following, viz: The cross-examination of Edward Greenleaf and John Cooley, as contained in the reporter's minutes of their testimony as taken or read in evidence in said suit vs. Illinois Central Railroad Company, at said trial in 1867.

Also the following, viz: The depositions of Porter G. Barton, George L. Whitney, Vincent Blackburn, David Buchanan, David S. Da-
336 vis, James Rowan, Benjamin R. Hall, Amos H. Proctor, Cornelius N. Rollins, Jonathan O. Howland, Edward Greenleaf, William Sheard, Maxwell Cornelius, (two depositions,) John Steele, Charles Wilson, Carlos Dutton, James Connor, James W. Greenwood, Luke Pratt, John Cooley, Henry G. Wallace, John Mulligan, Robert Eccles, Wilson Eddy, and William T. Dorsett, all of which were taken on behalf of said Illinois Railroad Company, in the said suit at law prosecuted against it by the said Turrill et al. Also, the examination of Edward Greenleaf and John Cooley, as contained in the reporter's minutes of the trial of said suit of Turrill and Wormley, tried in 1867, as aforesaid, and as read at said trial.

It is further stipulated and agreed by and between the parties aforesaid as to the testimony hereafter to be taken in the several suits and matters of controversy, that each witness may be sworn to testify the truth in each and every of said suits, and such testimony may be reduced to writing in a single deposition, as and for a deposition taken in each and every of said cases, and may be used as such in all and every of such suits with like effect as if taken and returned separately in each, unless at the time of the taking thereof either party shall expressly request the officer to take and return the same separately for any one or more of said suits.

It is further stipulated and agreed by and between the parties aforesaid that it shall be taken as true upon any trial of the said matter in controversy that the said Samuel H. Turrill has good title to said Cawood patent, and also that the said several defendants in the said several bills of complaint named are severally such incorporated companies as they are in said several bills of complaint alleged to be.

It is further stipulated and agreed by and between the several parties aforesaid that, upon any trial of the matters in controversy in said several suits the evidence and testimony hereinbefore stipulated to be used or taken shall have the like force and effect as evidence as if the same were or had been taken in each and every of the said suits mentioned in the introductory part of this stipulation, so far as the same is applicable.

337 It is further stipulated and agreed, by and between the several parties aforesaid, that all drawings, exhibits, diagrams, and models exhibited, or to be exhibited, and shown to the several witnesses whose testimony is to be used as aforesaid, may be retained by the party exhibiting the same until the time and times of trial of said suits, but without any change or alterations whatsoever therein after the same shall have been once exhibited and put in evidence; provided, in case of any injury or accident thereto, the same may be repaired and restored to the condition in which the same were when put in evidence, or

referred to by the witnesses to whom the same may have been exhibited.

Dated Chicago, July 6th, 1869.

(Signed) BECKWITH, AYER & KALES,
Solicitors for Samuel H. Turrill.
JOHN N. JEWETT,
Solicitor for Illinois Central Railroad Company.
H. W. BLODGETT,
For Chicago, Burlington & Quincy Railroad Company; Chicago & Alton Railroad Company; Michigan Southern & Northern Indiana Railroad Company; Pittsburgh, Ft. Wayne & Chicago Railroad Company.

338 *Patent.*

THE UNITED STATES PATENT-OFFICE.

To all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the records of this office of letters-patent granted Joseph D. Cawood, September 9, 1856, for improvement in repairing railway bars; also, of file-wrapper in said application.

In testimony whereof I, D. P. Holloway, Commissioner of Patents, have caused the seal of the Patent-Office to be hereunto affixed, this twenty-fourth day of June, in the year of our Lord one thousand eight hundred and sixty-two, and of the Independence of the United States the eighty-sixth.

[SEAL.] D. P. HOLLOWAY.

THE UNITED STATES OF AMERICA.

(No. 15687.)

To all to whom these letters-patent shall come:

Whereas Joseph D. Cawood, of Marshall, Michigan, has alleged that he has invented a new and useful improvement in repairing railway bars, which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the Treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose,

339 These are, therefore, to grant, according to law, to the said Joseph D. Cawood, his heirs, administrators, or assigns, for the term of fourteen years from the ninth day of September, one thousand eight hundred and fifty-six, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Cawood, in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof I have caused these letters to be made patent, and the seal of the Patent-Office has been hereunto affixed.

Given under my hand at the city of Washington this ninth day of September, in the year our Lord one thousand eight hundred and fifty-

six, and of the Independence of the United States of America the eighty-first.

[SEAL.] GEORGE C. WHITNEY,
Acting Secretary of the Interior.

Countersigned and sealed with the seal of the Patent-Office.

C. MASON,
Commissioner of Patents.

The schedule referred to in these letters-patent and making part of the same.

To all whom it may concern:

Be it known that I, Joseph D. Cawood, of the town of Marshall, county of Calhoun, State of Michigan, have invented a new and useful improvement in the common anvil or swage-block, for the purpose of welding up and reforming the ends of railroad-rails when they have exfoliated or become shattered from unequal wear, occasioned by the inequalities of the road, (six inches or so of the extreme end of the rail being frequently destroyed, while the remainder is perfectly sound;) and I do hereby declare that the following is a full, clear, and exact decription of the construction and operation of the same, reference being had to the annexed drawing, making a part of this specification, and giving a perspective view of the machine:

340 A, representing the bed-sill on which the anvil is placed; B, the anvil or swage-block of cast iron; C C, recesses or dies across the face the shape of the side of the rail; D, solid block making a part of anvil, with its side shaped to the side of rail while placed in its natural position; E, a movable press-block, held down to anvil by dove-tail tongues *a* on the anvil and grooves in the movable press-block, and operated by two eccentric cams, F, back and forth in a longitudinal direction, to press the rail together while forming its ends, and with sufficient travel to extricate the rail without altering its vertical position; G, a rail of the T-form in its position between the press-blocks.

I usually make my improved anvil and swage block of cast iron, between four and five feet long and sixteen inches wide across the face, with two forms or recesses, *c c*, at one end, right and left, of a form corresponding with the sides of the rail; close to these is cast a raised block, D, nearly as high as the rail, and with its fartherest edge also shaped to fit the sides of the rail when it lies across the anvil in its natural position. Next this I attach to the face of the anvil, by dove-tail tongues and grooves or any other convenient manner, what I call a movable press-block, E, with a similar but reversed shaped edge, lying opposite the other, so as to enclose the rail between the two as in the jaws of a vise. This block I work by two eccentric cams, F, on a shaft which is attached to the anvil by two standards, H H, with bearings I I, either cast on or bolted to the edge of the same, so that half a turn of the crank will move the press-block over a space a little more than the extreme width of the rail. The mode of using this machine is extremely simple and effective. A piece of iron (being of a size suitable to the deficiency of the rail) having been prepared and put in the fire, the rail being suspended by its middle to the level of the anvil, is brought to a welding-heat, and then swung round from the fire into the space between the two blocks, where it is by a half turn of the crank pinched together by means of the cams F; the welding-piece is then laid

341 on top of the rail in the usual way, and leveled up, and shaped

by a swage, held by the smith, of the form of that section which projects above the blocks, thus accomplishing at one heat what usually requires three or more.

Should any imperfections remain, which is not usual if the first operation is properly gone through with, they can be removed by proper hand-swages after placing the rail in the recesses C C for that purpose.

I do not claim the anvil-block nor its recesses, but what I do claim as my invention, and desire to secure by letters-patent, is, the movable press-block E, having its edge formed to the side of the rail G, in combination with another block, D, with its edge of a similar but reverse form, (the movable blocks to be operated by two cams, or in any other convenient manner,) for the purpose of pressing between them a T or otherwise shaped rail, thereby greatly facilitating the difficult operation of welding and renewing the ends of such rails after they have been damaged, in the manner herein described and set forth.

JOSEPH D. CAWOOD.

Witnesses:
GEORGE JOHNSON.
JAMES A. WAY.

Complainant's title is admitted by the stipulation supra, p. 47.

342 CERTIFIED COPY OF RECORD AND JUDGMENT IN THE CASE OF SAMUEL H. TURRILL AND CHARLES WORMLEY VS. ILLINOIS CENTRAL RAILROAD COMPANY.—IN THE CIRCUIT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS.

Declaration.

The circuit court of the United States for the seventh circuit and northern district of Illinois.

Of the 3d day of July, A. D. 1861, northern district of Illinois, ss:

Samuel H. Turrell and Charles Wormley, who are citizens of the State of Illinois, by Walker, Van Arman & Dexter, their attorneys, come and file this their declaration as commencement of suit, and complain of the Illinois Central Railroad Company, a corporation created by virtue of and existing under the laws of the State of Illinois, in a plea of trespass on the case.

For that one Joseph D. Cawood, of the city of Marshall, in the State of Michigan, was the original and first inventor of a new and useful improvement in repairing railway-bars, to wit, "An anvil or swage-block for the purpose of welding up and reforming the ends of railroad-rails where they have exfoliated or become shattered from unequal wear occasioned by the inequalities of the road," in all, as set forth in his specifications and drawings in the letters-patent hereinafter mentioned and fully described, the same being a new and useful improvement in the repairing of railway-bars as aforesaid, which was not known or used before his said invention, which was not at the time of his application for a patent, as hereinafter mentioned, in public use or on sale with his consent or allowance.

343 And the said Cawood, being so as aforesaid the inventor thereof, and being also a citizen of the United States, on the 9th day of September, eighteen hundred and fifty-six, upon due application therefor, did obtain letters-patent therefor under the seal of the Patent-Office of the United States, signed by the Secretary of the Interior and

countersigned by the Commissioner of Patents of the United States, bearing date the day and year aforesaid, whereby there was secured to him, his heirs, administrators, or assigns, for the term of fourteen years from and after the date of the patent, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said invention and improvement, as by the said letters patent in court to be produced will more fully appear.

And the said plaintiff further says that the said Cawood exercised and enjoyed the right secured to him by the said letters-patent from the said ninth day of September, 1856, to the eleventh day of November, 1856, on which last-mentioned day the said Cawood, by his deed of that date, for a valuable consideration conveyed to one Francis W. Sherman one-third of his right and claim in the said letters-patent; and, also, on the first day of June, A. D. 1857, said Cawood, by his deed, conveyed, for a valuable consideration, to said Francis W. Sherman and one George Johnson, each, one undivided fourth, and to one Darius Clark, and to one Emmons Clark, each, one undivided eighth parts right under said patent, reserving to himself one undivided fourth of his right and claim in the said letters-patent, and, also, excepting therefrom and from said conveyance the right heretofore conveyed to the Michigan Central Railroad Company, New York Central Railroad Company, Cincinnati, Hamilton & Dayton Railroad Company, Galena & Chicago Union Railroad Company, Chicago & Rock Island Railroad Company, Indianapolis, Pittsburgh & Cleveland Railroad Comapny, Bellefontaine & Indiana Railroad Company, Little Miami, Columbus & Xenia Railroad Company, to make and to use said invention and improvement for their own
344 use and roads, and also excepting the right to make and vend to others to be used the said invention in the State of Wisconsin; and further, that on said June 1, 1857, the said Francis W. Sherman and George Johnson, by their joint deed of that date, for a valuable consideration, reconveyed and re-assigned to the said Cawood all their right and claim in the said letters-patent; and further, that said Darius Clark and Emmons Clark, on the twenty-first day of September, 1858, by their joint deed of that date, conveyed to one David H. Williams, for a valuable consideration, all their right and claim in said letters-patent; and further, that the said Francis W. Sherman, on the first day of March, 1859, by his deed of that date, for a valuable consideration, conveyed all his right and claim in said letters-patent to one Benoni S. Gleason; and further, that said David H. Williams, on the tenth day of March, 1859, by his deed of that date, for a valuable consideration, conveyed all his right and claim in said letters-patent to said Francis W. Sherman; and further, that said Francis W. Sherman, on the tenth day of March, 1859, by his deed of that date, for a valuable consideration, conveyed to one Benoni S. Gleason all his right and claim, delivered under the last-mentioned deed (of David H. Williams to him) in the said letters-patent; and further, that the said Francis W. Sherman, on the eleventh day of March, 1859, by his deed of that date, conveyed, for a valuable consideration, to the said Benoni S. Gleason, all his interest in said letters-patent derived by the assignment of said David H. Williams to him, and, also, of the assignment of said Sherman and others above referred to, bearing date June 1, 1857; and further, that the said Benoni S. Gleason and Joseph D. Cawood and George Johnson, on the eighteenth day of October, 1859, by their joint deed of that date, for a valuable consideration, conveyed to William H. Dunning and Charles Wormley, one of the plaintiffs herein, all their right and claim in said letters-patent; and further, that the said William H. Dun-

ning and the plaintiff Charles Wormley, on the twenty-third day
345 of August, 1860, by their joint deed of that date, for a valuable consideration, conveyed to the plaintiff, Samuel H. Turrell, the fifty-five per cent., meaning thereby fifty-five one-hundredths part interest in said letters-patent, excepting the right to make, vend, and use said invention and improvement in the States of Wisconsin and California; and further, that the said William H. Dunning, on the twenty-third day of August, 1860, by his deed of that date, for a valuable consideration, conveyed to the said plaintift Wormley all his right and claim in said letters-patent, as fully appears by said several deeds of assignment duly executed and recorded in this court, to be produced, will more fully appear; whereby said plaintiffs became possessed of the entire and sole right and power in them and their assigns to make, use, and vend to others to be used the said invention and improvement, except as aforesaid excepted, for repairing railway-bars.

And the said plaintiffs say that, from the time of the said conveyances and assignments to them as aforesaid hitherto, the said exclusive right has been and now is of great value, to wit, of the value of $50,000; yet the said Illinois Central Railroad Company, well knowing the premises, but contriving to injure the plaintiff, did afterwards, on the 24th day of August, A. D. 1860, during the said term of fourteen years, and before the filing of this declaration, at the place aforesaid, to wit, the northern district of Illinois, unlawfully and wrongfully, and without the consent and allowance and against the will of the plaintiff, make, use, and vend the said invention and improvement, in violation and infringement of the exclusive right so secured to the plaintiff as aforesaid, and contrary to the form of the statute of the United States in such case made and provided, whereby the plaintiffs have been greatly injured and deprived of great profits and advantages which they might, and otherwise would, have derived from said invention, and have sustained actual damage to the amount of twenty thousand dollars, and by force of the statute aforesaid an action hath ac-
346 crued to them to recover the said actual damage, as the court may see fit to order and adjudge; yet the said Illinois Central Railroad Company, though requested, have never paid the same, or any part thereof, to the plaintiff, but have refused, and yet refuse so to do.

WALKER, VAN ARMAN & DEXTER,
Plaintiffs' Attorneys.

(Endorsed:) Filed July 9, 1861. Wm. H. Bradley, clerk.

Plea.

UNITED STATES OF AMERICA,
Northern District of Illinois, ss:

In the circuit court of the United States for said district, of the October term, A. D. 1861.

SAMUEL H. TURRILL AND CHARLES WORMLEY
vs.
ILLINOIS CENTRAL RAILROAD COMPANY.

And the said defendant, by Scates, McAllister & Jewett, its attorneys, comes and defends the wrong and injury, when, etc., and says that it is not guilty of the said several supposed grievances above and in he said plaintiffs' declaration laid to its charge, or any or either of

them, or any part thereof, in manner and form as the said plaintiffs have thereof complained against it; and of this the said defendant puts itself upon the country, etc.

SCATES, McALLISTER & JEWETT,
Attorneys for the Defendant.

And the said plaintiffs doth the like.

BECKWITH, AYER & KALES,
Attorneys for the Plaintiffs.

(Endorsed:) Filed October 7, 1867. Wm. H. Bradley, clerk.

347 *Notice of special matter in defense.*

Circuit court of the United States for the northern district of Illinois.

SAMUEL H. TURRILL AND CHARLES WORMLEY }
vs.
ILLINOIS CENTRAL RAILROAD COMPANY. }

The plaintiffs in the above-entitled cause will please take notice that the defendant will on the trial of said cause prove, in bar of said plaintiffs' action, that the said Joseph D. Cawood was not the original and first inventor of the device, improvement, or thing described and claimed by him in the letters-patent of the United States referred to in the declaration in said cause, or of any material or substantial part thereof, as is claimed in the said plaintiffs' declaration.

And the said defendant will further prove on said trial, as aforesaid, that the said alleged invention of the said Joseph D. Cawood was publicly used at the United States armory at Springfield, in the State of Massachusetts, long prior to the time when it is alleged the said Joseph D. Cawood invented the same, and that the said alleged invention and the prior public use thereof, as aforesaid, was well known to one Sela Chandler, late of Springfield, in the State of Massachusetts aforesaid, now deceased.

And the said defendant will further prove on said trial as aforesaid that the said alleged invention of the said Joseph D. Cawood was known to and publicly used by the mechanics and workmen employed in the United States armory at Springfield, in the State of Massachusetts, long prior to the time when it is alleged the said Joseph D. Cawood invented the same, and that a knowledge of such prior public use was had by John Cooley, Luke Pratt, W. F. Dorsett, and H. D. Wallace, now residing at Springfield, in said State of Massachusetts.

348 And the said defendant will further prove on said trial, as aforesaid, that the said alleged invention of said Joseph D. Cawood, was known to and publicly used by John Cooley, Luke Pratt, W. T. Dorsett, and H. D. Wallace, employés and workmen in the United States armory at Springfield, in the State of Massachusetts, now residing at said Springfield, in said State, long prior to the time when it is alleged the said Joseph D. Cawood invented the same, which said prior public use, as well as the knowledge thereof as aforesaid, the said defendant will upon trial prove by the said John Cooley, Luke Pratt, W. F. Dorsett, and H. D. Wallace, or some of them.

McALLISTER, JEWETT & JACKSON,
Attorneys for Defendant.

To the plaintiffs above named, or Messrs. Arrington & Dent, their attorneys.

Due service of the above and foregoing notice, by the delivery to us of a true and correct copy thereof, is admitted this 13th day of January, A. D. 1865.

S. H. TURRILL.
CHARLES WORMLEY,
By S. H. TURRILL.

(Endorsed:) Filed April 6th, 1865. Wm. H. Bradley, clerk.

Notice of special matter in defense.

UNITED STATES OF AMERICA,
Northern District of Illinois:

In the circuit court of the United States for the northern district of Illinois.

SAMUEL H. TURRILL AND CHARLES WORMLEY
vs.
ILLINOIS CENTRAL RAILROAD COMPANY.

The plaintiffs in the above-entitled cause will please take notice that the defendant above named will prove on the trial of the said
349 cause, in bar of the said plaintiffs' action, that the said Joseph D. Cawood was not the original and first inventor of the thing described and claimed by him in the letters-patent of the United States referred to in the declaration in said cause, or of any material or substantial part thereof, as is claimed in the said plaintiffs' declaration.

And the said defendant will further prove on said trial as aforesaid that the said alleged invention of the said Joseph D. Cawood was known to and publicly used by Harris B. Johnson and Francis Chapin and others, of Springfield, in the State of Massachusetts, and Thomas Warren, now of Millbury, in said State of Massachusetts, at Springfield, in the State of Massachusetts, and at various other places, long prior to the time when it is alleged the said Joseph D. Cawood invented the same; and the said defendant will on said trial prove as aforesaid, by the said Harris B. Johnson, Francis Chapin, and Thomas Warren, or some of them, that a knowledge of such prior public use, at Springfield aforesaid, was had by them.

And the said defendant will further prove on said trial as aforesaid that the said alleged invention of the said Joseph D. Cawood, described in the letters-patent referred to in said plaintiffs' declaration, and the material and substantial parts thereof, were known and publicly used in the workshops of the Michigan Central Railroad Company and elsewhere, at Marshall, in the State of Michigan, long prior to the time when it is alleged the said Joseph D. Cawood invented the same, and that a knowledge of such prior public use, at Marshall, in the State of Michigan aforesaid, was had by Amos Wilson, Joseph J. Etheridge, Alexander McKinley, W. Primble, who now reside at Marshall aforesaid, William Duthrie, who now resides at Lexington, in said State of Michigan, and Levi Wilson, who now resides at Peoria, in the State of Illinois, by which said last-named person, amongst others, said defendant will on said trial prove such public prior use at Marshall, in the State of Michigan aforesaid; and also that the said Joseph D. Cawood surreptitiously and unjustly ob-
350 tained the said letters-patent for that which was, in fact, invented or discovered by another, to wit, one James McClellan, who, in the years 1852 and 1853, resided at said Marshall, in the State of Michigan,

and who was using reasonable diligence in adapting and perfecting the same.

And the said defendant will further prove on said trial as aforesaid that the said alleged invention of the said Joseph D. Cawood, described in the letters-patent referred to in the said declaration, and the substantial and material parts thereof, were publicly used in the city of Cincinnati, in the State of Ohio, long prior to the time when it is alleged the said Joseph D. Cawood invented the same; and that a knowledge of such prior public use at Cincinnati aforesaid was had, and the same will be proved, by one Greenleaf, (whose first name is unknown to said defendant,) who now resides at Indianapolis, in the State of Indiana, and is in charge of a locomotive or repair shop at said Indianapolis.

And the said defendant will further prove upon said trial as aforesaid that the same thing alleged to have been invented by the said Cawood and patented to him as aforesaid, and every substantial and material part thereof, was known and publicly used at Tonawanda, in the State of New York, long prior to the time when it is alleged the said Cawood invented the same; and that a knowledge of such prior public use at Tonawanda aforesaid was had, and the same will be proved by one Hovey, (whose first name is also unknown to said defendant,) but who now resides at Cleveland, in the State of Ohio, and is at present master-mechanic of the Cleveland & Pittsburgh Railroad.

And the said defendant will further prove on said trial as aforesaid that the said alleged invention of the said Joseph D. Cawood, described in the letters-patent referred to in said declaration of the said plaintiffs, and the substantial and material parts thereof, were known and publicly used at Marshall, in the State of Michigan, long prior to the time when it is alleged the said Joseph D. Cawood invented the same, and that a knowledge of such prior public use, at Marshall aforesaid, was had by one James McClellan, of said Marshall.

351 Also, that the said alleged invention of the said Cawood was known and publicly used at Troy, in the State of New York, long prior to the time when it is alleged the said Cawood invented the same, and that a knowledge of such prior public use, at Troy aforesaid, was had by one William Burden, of said Troy.

Also, that the said alleged invention of the said Cawood was known and publicly used at Howell Works, Monmouth County, New Jersey, long prior to the time when it is alleged the said Cawood invented the same, and that a knowledge of such prior public use, at said Howell Works, was had by James P. Smith, of Jamesburg, New Jersey; Alfred H. Smith, of Jamaica, Long Island, in the State of New York; Joseph M. Nimsey, of Square, Monmouth County, New Jersey, and Frederick Stokey, of said Howell Works aforesaid, and others; and the said defendant will, upon the trial aforesaid, prove by the said James McClellan, William Burden, James P. Smith, Alfred H. Smith, Joseph M. Nimsey, Frederick Stokey, and others, the public use of said alleged invention of the said Joseph D. Cawood, at the several places aforesaid, long prior to the time when the said Cawood is alleged to have invented the same; and also that the thing or machine patented to the said Cawood, and described in the patent referred to in said plaintiffs' declaration, was in public use with the consent and allowance of said Cawood for more than two years prior to his application for a patent therefor.

And the said defendant will further prove on said trial as aforesaid that the said alleged invention of the said Joseph D. Cawood, described in the letters-patent referred to in the plaintiffs' declaration, and the

substantial and material parts thereof, were known to and publicly used by Henry Asseltyne, of Swanton, in the State of Vermont; I. P. Sherwood, of Fort Edward, in the State of New York; H. I. Wilson, of Chicago, in the State of Illinois; George D. Whitney, of Boston, in the State of Massachusetts; Robert H. Eddy, also of Boston, aforesaid; James Whitcomb, of Watertown, in the State of New York;
352 James R. Sweeney, also of said Watertown; George S. Griggs, of Roxbury, in the State of Massachusetts; George Richards, also of said Roxbury, and Edwin Garfield, of Hartford, in the State of Connecticut; and that the said alleged invention or device of the said Cawood, and material and substantial parts thereof, were publicly used by each of the several persons above named, respectively, at their respective places of residence aforesaid, prior to the time when it is alleged the said Cawood invented the same, and that the several persons aforesaid, and each of them, had knowledge of such prior public use of said invention or device and the material and substantial parts thereof at the several places aforesaid.

And the defendant will further prove, upon said trial as aforesaid, in bar of the said plaintiff's action, that prior to the alleged invention or discovery of the said Joseph D. Cawood of the thing claimed and alleged to be patented to him in and by the letters-patent referred to in the declaration of the said plaintiffs, the same and every material and substantial part thereof were described in the following-named public works, that is to say:

In the "Transactions of the Society instituted at London for the Encouragement of Arts, Manufactures, and Commerce," vol. 48, London, 1831, and particularly at the article commencing at page 250, and extending through pages 259, 260, and 261 of said public work.

In the "Technological Encyclopædia," by Johan Joseph Prechtt, vol. 2 of plates, plates 336, 337, and 338, and pages 104 to 131, both inclusive, published at Stuttgard, in 1846, the said public work being in the German language.

In "Hotzopffel's Turning and Mechanical Manipulations," vol. 2, London, 1847, and especially at pages 858, 859, and 860 of said public work.

In the "Cyclopædia or Universal Dictionary of Arts and Sciences
353 and Literature," by Abraham Rees, D. D., F. R. S., and F. L. S., S. S., American Association, first American edition, article "Forging."

In the "Treatise on the Progressive Improvement and Present State of Manufactures in Metal," vol. first, title "Iron and Steel," printed at London for Longman, Brown, Green and Longman, Paternoster Row, and John Taylor, Upper Gower street, in 1847, page 215, figure 72.

In "The Practical Metal-Maker's Assistant," by Oliver Byrne, Philadelphia, Henry Cary Baird, 1851, and particularly at pages 25, (figure 8,) 26, (figures 9, 10, 11, and 12,) 35, (figures 16 and 17, on said page,) 60 and 61, (figure 67,) of said public work.

And the said defendant will further prove, upon said trial as aforesaid, in bar of the said plaintiffs' action, that prior to the alleged invention or discovery by the said Joseph D. Cawood, of the thing claimed and alleged to be patented to him in and by the letters-patent referred to in said plaintiffs' declaration, the same was, and the substantial and material parts thereof were described, contained, represented, and made public in the following-named letters-patent, respectively, and the drawings respectively thereto annexed and forming a part thereof:

Letters-patent of the United States issued on the 31st day of De-

cember, 1845, to Samuel G. Reynolds, of Bristol, in the State of Rhode Island, for a machine for heading and pointing pins.

Letters-patent of the United States issued on the 3d day of September, 1846, to Thomas W. Harvey, of the city and State of New York, for a machine for heading screw-blanks.

Letters-patent of the United States issued on the 8th day of May, 1849, to Davis L. Weatherhead, of Providence, in the State of Rhode Island, for an improved method of constructing and operating the header in bolt-machines.

Letters-patent of the United States issued on the 18th day of June, 1850, to Ammi M. George, of Nashua, in the State of New Hampshire, for a spike-machine.

354 Letters-patent of the United States issued on the 16th day of July, 1850, to Moore Hardaway, of Troy, in the State of New York, for a spike-machine.

Letters patent of the United States issued on the 30th day of July, 1850, to William E. Ward, of Port Chester, in said State of New York, for an improved bolt and rivet machine.

Letters-patent of the United States issued on the 20th day of August, 1850, to John Van Brockline, of Middleport, in said State of New York, for an improvement in machinery for heading-bolts, rivets, etc.

Letters-patent of the United States issued on the 23d day of December, 1851, to Nathan Starks, of Albany, in said State of New York, for an improvement in bolt-heading machines.

Letters-patent of the United States issued on the 4th day of March, 1856, to George Woodward, of Brunswick, in the State of Maine, for an improved machine for heading bolts.

Letters-patent of the United States issued on the 14th day of September, 1852, to G. H. Richards, assignor to C. G. Plimpton, for an improvement in forging-machines.

Letters-patent, granted in England, in the year 1846, to William Church, for machinery for stamping, flattening, and shaping metals, etc., No. 11197, and especially at figures 12, 13, 22, 28, 29, 30, and 34 of the drawings annexed thereto, and the text of the specifications thereof, descriptive of said *ffgures*.

June 10th, 1862.

JNO. N. JEWETT,
Attorney for Defendant.

To Messrs. WALKER, VAN ARMAN & DEXTER,
Attorneys for Plaintiffs.

355 Service of the above and foregoing notice, by the delivery of a copy thereof to us, is admitted this 10th day of June, A. D. 1862.

WALKER, VAN ARMAN & DEXTER,
Attorneys for Plaintiffs.

(Endorsed:) Filed April 6, 1865. Wm. H. Bradley, clerk.

Stipulation.

United States circuit court, northern district of Illinois.

SAMUEL H. TURRILL AND CHARLES WORMLEY } October term, A. D.
vs. } 1867.
THE ILLINOIS CENTRAL RAILROAD COMPANY. }

It is hereby stipulated and agreed by the attorneys of the respective

parties to the above-entitled suit, that the issue joined in the said cause shall be tried and determined by the court at the present term thereof, before the honorable David Davis and Thomas Drummond, judges of the said court, without the intervention of a jury. A jury-trial being hereby waived, pursuant to the statutes in such case made and provided; neither party, however, being understood to waive the right to request the court to make a special finding or special findings in the case, and to state the facts upon which its judgment may be granted, but neither party hereby consenting that such request of the other party shall be granted by the court.

Chicago, October 24, 1867.

BECKWITH, AYER & KALES,
Attorneys for Plaintiffs.
JNO. N. JEWETT,
Attorney for Defendant.

(Endorsed:) Filed October 24, 1867. William H. Bradley, clerk.

356 Circuit court of the United States for the northern district of Illinois.

FRIDAY, *November 8th, A. D.* 1867.

Present: The Hon. David Davis, circuit judge, and the Hon. Thomas Drummond, district judge.

Judgment.

SAMUEL H. TURRILL AND CHARLES WORMLEY
vs.
ILLINOIS CENTRAL RAILROAD COMPANY. } Trespass on the case.

The court having considered, and now being fully advised upon the matter heretofore submitted herein, find the defendant guilty, and assess the plaintiffs' damages to the sum of twelve hundred and ninety-two dollars.

It is thereupon considered and adjudged by the court, that the said plaintiffs do have and recover of the said defendant the said sum of twelve hundred and ninety-two dollars, their damages so as aforesaid assessed, together with their costs and charges by them about their suit in this behalf expended, amounting to the sum of two hundred and fifty-nine dollars and sixty-seven cents, and that they have their execution therefor.

Mandate.

UNITED STATES OF AMERICA, *ss:*

[SEAL.] The President of the United States of America to the honorable the judges of the circuit court of the United States for the northern district of Illinois, greeting:

Whereas lately, in the circuit court of the United States for the northern district of Illinois, before you, or some of you, in a cause between Samuel H. Turrill and Charles Wormley, plaintiffs, and the Illinois Central Railroad Company, defendant, wherein the judgment of
357 said circuit court entered in said cause on the 8th day of November, 1867, was in favor of the said plaintiffs, and against the said defendant, The Illinois Central Railroad Company, as by the inspection

of the transcript of the record of the said circuit court, which was brought into the Supreme Court of the United States by virtue of a writ of error, agreeably to the act of Congress in such case made and provided, fully and at large appears.

And whereas, in the present term of December, in the year of our Lord one thousand eight hundred and sixty-eight, the said cause came on to be heard before the said Supreme Court, on the said transcript of the record, and on the stipulation of Mr. Gifford, of counsel for the plaintiff in error, on file, it is now here ordered and adjudged by this court that this writ of error be, and the same is hereby, dismissed, with costs; and that the said plaintiffs recover against the said defendant, The Illinois Central Railroad Company, for their costs herein expended, and have execution therefor.

16TH NOVEMBER, 1869.

You, therefore, are hereby commanded that such execution and proceedings be had in said cause as, according to right and justice, and the laws of the United States, out to be had, the said writ of error notwithstanding.

Witness the honorable Salmon *B.* Chase, Chief-Justice of said Supreme Court, the first Monday of December, in the year of our Lord one thousand eight hundred and sixty-eight.

D. W. MIDDLETON,
Clerk of the Supreme Court of the United States.

Costs of plaintiff paid by defendant.

(Endorsed:) Filed December 11, 1869. Wm. H. Bradley, clerk.

Circuit court of the United States for the northern district of Illinois.

SATURDAY, *December 11th, A. D.* 1869.
Present: The Hon. Thomas Drummond, judge.

358 SAMUEL H. TURRILL AND CHARLES WORMLEY } Mandate.
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY. }

Now come the plaintiffs, by their attorney, who file the mandate from the Supreme Court, dismissing the writ of error heretofore issued in this behalf, and, on motion of said attorney, it is ordered by the court that the plaintiffs have execution upon their said judgment, recovered herein on the eighth day of November, A. D. eighteen hundred and sixty-seven, and that the plaintiffs have and recover of the defendant their costs and charges in this behalf, together with the costs in the Supreme Court, and that they have execution therefor.

Execution.

UNITED STATES OF AMERICA,
Northern District of Illinois, ss:

The United States of America to the marshal of the northern district of Illinois, greeting:

We command you, that of the goods and chattels, lands and tenements, of the Illinois Central Railroad Company, defendant, in your

district, you cause to be made fifteen hundred and fifty-one dollars and sixty-seven cents, which Samuel H. Turrill and Charles Wormley, plaintiffs, lately in our circuit court of the United States for the northern district of Illinois, before the judges thereof, at Chicago, in the district aforesaid, recovered against said defendant, for damages which said plaintiffs had sustained in that behalf, as well as for their costs and charges by them about their suit in this behalf expended, whereof said defendant is convicted, as appears to us of record. And have you
359 that money at the clerk's office of our said court in ninety days from the date hereof, to render to the said plaintiff for damages aforesaid, and this writ.

Witness the Hon. Salmon P. Chase, Chief-Justice of the Supreme Court of the United States of America, at Chicago aforesaid, this thirteenth day of December, in the year of our Lord one thousand eight hundred and sixty-nine, and of our Independence the ninety-fourth year.
[SEAL.] WM. H. BRADLEY, *Clerk.*

With endorsement as follows:
Received, December 13th, 1869, at 3 o'clock p. m.
B. H. CAMPBELL,
U. S. Marshal,
By A. B. COTES, *Deputy.*

I return the within writ, satisfied in full, this 16th day of December, A. D. 1869. The defendant having this day paid to me the sum of nineteen hundred and seven $\frac{47}{100}$ dollars, in full for damages, costs, and interest, as well as for marshal's fees in this writ.
B. H. CAMPBELL,
U. S. Marshal.
By S. H. TOURTELLOTTE, *Deputy.*

Marshal's fees: One demand, 50 cents; one return, 10 cents; mileage, 12 cents; interest, $15.73; total, $16.45.

Received of B. H. Campbell, U. S. marshal for northern district of Illinois, eighteen hundred and ninety-one $\frac{2}{100}$ dollars ($1,891.02) on the within writ, this 17th day of December, A. D. 1869.
WM. H. BRADLEY, *Clerk.*

No. 4565. Circuit court United States, northern district of Illinois. Samuel H. Turrill et al. vs. Illinois Central Railroad Company. Fi. fa. Damages, $1,292.00; costs, 259.67; defendant's fee-bill, 122.30;
360 costs in supreme court, costs on appeal, etc., 5.00. Collect $1,678.97. Judgment rendered November 8th, A. D. 1867. Wm. H. Bradley, clerk.

Filed December 17th, A. D. 1869.
WM. H. BRADLEY, *Clerk.*

BECKWITH, AYER & KALES.
Plaintiffs' Attorneys.

NORTHERN DISTRICT OF ILLINOIS, *ss:*

I, William H. Bradley, clerk of the circuit court of the United States for said district, hereby certify the above and foregoing to be a true, correct, and complete copy of the following papers and record entry, to wit:

The declaration, plea, notices of special matter in defense filed on the

6th day of April, 1865, stipulation to waive jury and for trial by court and the judgment, the mandate from the Supreme Court and the order of court in said mandate, and the execution issued thereon and endorsement on the same in said entitled cause, in said court, wherein Samuel H. Turrill and Charles Wormley are plaintiffs, and The Illinois Central Railroad Company is defendant, as the same appear from the records and originals remaining in my custody.

In testimony whereof I have hereunto set my hand and affixed the seal of said circuit court, at my office, in the city of Chicago, in said district, this 17th day of December, in the year of our Lord one thousand eight hundred and sixty-nine, and of our Independence the ninety-fourth year.

[SEAL.] WM. H. BRADLEY, *Clerk.*

361 *Complainant's testimony.*

United States circuit court, northern district of Illinois. In equity.

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL RAILROAD COMPANY ET AL. } And in other cases as per stipulation.

Present: Complainant in person; Walter Curtis, esq., of counsel for complainant, and S. M. Whipple, esq., of counsel for respondents.

EDWARD S. RENWICK.

EDWARD S. RENWICK, produced at Boston, August 25th, 1869, by complainant, being duly sworn, doth depose and say, in answer to interrogatories propounded by Walter Curtis, esq., as follows, viz:

1. State your name, age, residence, and profession.

A. Edward S. Renwick; age, 46 years; residence, Milburn, New Jersey. I am by profession a civil and mechanical engineer.

2. Please state whether you have examined the letters-patent of Joseph D. Cawood for an improved anvil or swage-block for the purpose of welding up and re-forming the ends of railroad rails, and are familiar with the machine therein described.

A. I have frequently examined the letters-patent referred to, and am acquainted with the construction and operation of the machine described therein.

3. Please state whether you are familliar with the process of
362 welding and forging the sockets of bayonets, and with the machine used for that purpose at Springfield, Massachusetts, and which is now before you; whether you find in that machine substantially such parts as in the Cawood machine, arranged, combined, and operating in the manner pointed out in Cawood's patent, and adapted to produce the result effected by the Cawood machine. And, if not, please explain fully the substantial differences between the characteristics of this machine and those of the Cawood machine.

A. I am familiar with the process of welding and forging the sockets of bayonets, and with the machine used for that purpose at Springfield, Massachusetts, which is now before me, and which, or the fac simile of which, I saw in use at that place for the said purpose about four years ago. I do not find in that machine substantially the same parts as in the Cawood machine, arranged, combined, and operating n the manner pointed out in Cawood's patent, and either adapted

to produce or cap'ble of producing the results effected by the Cawood machine.

The Cawood machine requires the combination of two press-blocks of peculiar construction, substantially in the manner described in the patent. The peculiarities of the press-blocks are: First. That their faces are parallel with each other, so as to grip any portion of a long article which may be placed between them. Second. That they are nearly as high as the rail which is to be operated upon, so that the crowning portion of the rail is left entirely exposed, thereby permitting a patch of the full width of the head of the rail to be applied to it when it is clamped between the press-blocks; permitting also the unobstructed use of the swage for imparting the required rounded form to the crown of the rail, and permitting any surplus of iron to escape latterly at the broadest part of the head of the rail between the upper edges of the press-blocks and the lips or edges of the swage. Third. That the upper portions of the faces of the press-blocks embrace the under side of the head of the rails, so the lateral spreading of the portion of the head below its crown is avoided, and also that a mold is pre-
363 sented by the faces of the press-blocks to impart the required form to the under side of a patch, in case the fracture to be repaired has extended downwards below the crown of the head of the rail. The manner in which these press-blocks are combined is through the intervention of an anvil or block of sufficient size, strength, and weight to maintain the press-blocks in their position when gripping the rail, and to sustain the rail and the press-blocks against the blows of the instruments which are used in welding the patch to the rail and imparting to it the required form. Moreover, the combination is such that when the rail lies in its natural position upon a seat between the press-blocks, the latter grip it in that position, so that the rail does not hang suspended from its head, but is supported simultaneously at two parts of its height, viz, at its base and at the under sides of its head.

The bayonet-machine does not embody the above-mentioned characteristics of the Cawood machine. It undoubtedly has two jaws which are adapted to holding the article it is intended to operate upon, and these jaws may be called press-blocks, although not with propriety, because the construction of the jaws of that machine is such that they come together without griping or pressing upon the article which they hold, and simply form a rest upon which the article is supported while it is operated upon by the trip-hammer, which is used in connection with the machine. They differ substantially from the press-blocks of the Cawood machine in the respect that their faces are not parallel with each other so as to enable them to grip any portion of a long article which may be placed between them, but are, on the contrary, constructed with cavities for the purpose of receiving projections of an article placed in one particular position, and of preventing that article from being moved from that position to any other. They also are combined with each other substantially in a different manner from that in which the Cawood press-blocks are combined, the combination in the former being such
364 that the article hangs suspended upon the upper edges of the jaws without being griped below the portion which rests upon the upper edges of the jaws. Moreover, that the article is supported at the under side of the band only, instead of being supported simultaneously at two parts of its height, as may be readily seen by placing a bayonet in the machine and looking underneath the blade, where an open space will be seen.

4. State whether or not you are familiar with a machine known as the

angle-iron machine, of which a model is now shown you, and whether you find in that machine substantially such parts as in the Cawood machine, arranged, combined, and operating in the manner pointed out in Cawood's patent, and adapted to produce, or capable of producing, the results effected by the Cawood machine; and, if not, please explain the substantial differences between the characteristics of this machine and the Cawood machine.

A. I am familiar with the angle-iron machine referred to and with its mode of operation, having been present at a trial of the case of S. H. Turrill et al. vs. The Michigan Southern & Northern Indiana Railroad Company, at Detroit, at the time Mr. Greenleaf, who claimed to be the inventor of it, testified as to its construction and operation, and having also read a report of the testimony given by him in the trial in Chicago in the fall of 1867.

I do not find in that machine substantially the same parts as in the Cawood machine, arranged, combined, and operating in the manner pointed out in Cawood's patent, and adapted to produce, or capable of producing, the results effected by the Cawood machine. The angle-iron machine has undoubtedly two jaws or press-blocks, adapted to holding the article it is intended to operate upon, and they are combined through the intervention of a mass of metal, but the press-blocks are constructed substantially different from those of the Cawood machine; they are
365 combined in a substantially different manner, and the mode of operation of the angle-iron machine is about as widely different from that of the Cawood machine as is possible with two machines having some general features of resemblance. Thus, in the angle-iron machine the press-blocks are materially higher than the article upon which they are to act, and yet they are so constructed that one entire limb of the angle-iron is exposed above their edges, so that that limb may spread laterally in both directions at every blow of the hammer, instead of being prevented from spreading laterally as the lower half of the head of a rail is prevented from spreading laterally by the press-blocks of the Cawood machine. The jaws or press-blocks in the angle-iron machine are combined in such manner that when the angle-iron is between them it hangs suspended from the upper edge of one of the press-blocks where one limb of the angle-iron rests, and it is not supported against the blows of the hammer at any other part of its height than the under side of the limb which rests upon that press-block, instead of being supported simultaneously at two parts of its height, as is the case when a rail is griped in the Cawood machine. The operation of the angle-iron machine was, in fact, to hold the article erect while it was permitted to spread both laterally over the press-blocks and downward between them, at every blow of the hammer, while the operation of the Cawood machine is to prevent the under side of the head of the rail from spreading laterally over the press-blocks, and to support the portion of the rail between the press-blocks from beneath, so as to prevent it from being driven downwards by the blows of the hammers upon the head, the mode of operation of each machine being well adapted to the purpose for which the machine is constructed.

5. Would it, then, in your judgment, be possible, as a matter of fact, to weld up and to re-form railroad-rails upon the angle-iron machine without first making such changes in that machine as would render it incapable of being used for the purpose of welding angle-iron?

A. It would not.

366 6. Please state whether you have examined and are familiar with the description of machines contained in letters-patent

granted in England, in the year 1846, for stamping, flattening, and shaping metals, and the drawings thereto annexed, and especially whether you are familiar with the machine as represented in Figures 33 and 34 of said drawings, and whether the model now shown you, marked "Church machine," is a correct representation of the machine represented in those drawings, and whether you find in that machine the parts characteristic of the Cawood machine, arranged, combined, and operating in the manner described in the Cawood patent, and capable of producing the result effected in the Cawood machine; and, if not, explain the substantial differences between the characteristics of this machine and the Cawood machine.

A. I have frequently examined and am familiar with the descriptions of the several machines contained in the letters patent referred to in the question, and particularly with the description and drawings of machine represented in Figures 33 and 34 of the drawings, parts of which are also represented on a much larger scale at Figures 29 and 30 of said drawings. The model shown me, marked "Church machine," is a correct representation of the last-mentioned machine.

I do not find in that machine the parts characteristic of the Cawood machine, arranged, combined, and operating in the manner described in the Cawood patent, and practically capable of producing the result effected by the Cawood machine, although it is within the limits of possibility that a highly ingenious and skillful mechanic might re-form a rail by the use of the Church machine, provided he welded on a patch before putting the rail into the machine, formed it by a hammer to a shape approximating that of the complete rail, removed any surplus material there might be by cutting it away, and then placed the rail in the Church machine and stamped it so as to smooth the surface which he had previously hammered, a mode of proceeding which would be more
367 tedious than that of welding and re-forming the rail by the use of the old grooved swage-block without press-block.

The Church machine referred to has, among other things, two press-blocks for griping a rail, while the latter rests upon an anvil-block, but the press-blocks of the Church machine are constructed substantially different from those of the Cawood machine, in the respect that the former are higher than the crown of the rail, and overlaps it, so that when the rail is griped between the press-blocks it would be practically impossible to apply to it a patch of the full width of the head of the rail. Moreover, a swage for imparting the required rounded form to the crown of the rail could not be used with the machine, because the overlapping edges of the press-blocks would prevent the edges of the swage from straddling the crown and descending upon it. The escape of any surplus metal at the broadest part of the head of the rail also would be prevented by the upper parts of the press-blocks, which not only overlap the crown of the rail, but extends some distance above it. The mode in which the press-blocks in the Church machine are combined also is different from the mode in which the press-blocks of the Cawood machine are combined; for, whereas the latter are combined by the anvil, the press-blocks of the Church machine are combined by means of a large rectangular frame which surrounds the anvil, and has large end pieces which extend across the ends of the anvil transversely to the length of the rail, and are provided with holes through which the rail must be inserted and withdrawn, a mode of combination which would render the machine practically valueless for repairing rails with the ordinary sledges and swage, which are used for operating upon the rail when clamped between the press-blocks of the Cawood machine.

7. Would it be possible for such a mechanic as you have alluded to in your last answer to construct, from the description of the machines contained in the Church patent, the Cawood machine?

368 A. In my opinion, it would not from those alone.

8. Please examine the two sets of models now shown you, marked, respectively, "Figures 34 and 30," and "Figure 13," and state what they represent.

A. The sets of models marked "Figures 34 and 30" represent short pieces of the two press-blocks of the face of the anvil-block, and of the face of the vertical press block of the Church machine, represented at Figures 33 and 34. End views of which instrumentalities are also represented at Figure 29 and Figure 30 in said patent. The set of models marked "Figure 13" represent short pieces of the two side press-blocks, of the face of the anvil-block, and of the vertical or top press-block of the machine represented at Figure 12 and Figure 13 of the Church patent. Each set of models being of about the same cross-section as the instrumentalities, would have to be operated upon a full-sized article. The red model, accompanying the set of models marked "34 and 30," represent' a short piece of a hollow rail, such as the Church machine represented at Figures 33 and 34 was designed to manufacture. The red model accompanying the set marked "Figure 13" represents a short piece of the rail which the Church machine represented at Figures 12 and 13 of the patent was designed to straighten.

9. What is the rule of the machine represented by Figure 13, as to the relative height of the side press-blocks and rail?

A. It is that the side press-blocks shall be as high as the rail, so as to overlap the rounded portion of the crown thereof.

10. State whether you have examined a certified copy of the letters-patent granted to Lyman Beebe and George F. Smith, June 9, 1857, and are familiar with the machine described therein, a model of which, marked "Beebe & Smith patent, June 9, 1857," is now shown to you, and whether you find in that machine substantially the same characteristics as in the Cawood machine, combined, arranged, and operating in substantially the same manner, and adapted to the production of

369 the same effect. Also please answer the same question as to the machines represented by the models now shown you, marked "Illinois C. R. R. Co. machine," "Etheridge machine," "Whitcomb machine," and "Exhibit A, E. B. G., notary public."

A. I have examined a certified copy of the patent granted to Beebe and Smith, referred to in the question, and am familiar with the machine described therein and represented by the model marked "Beebe & Smith patent, June 9, 1857." I also understand the construction and operation of the machines represented by the models "Ills. C. R. R. Co. Machine," "Etheridge Machine," "Whitcomb Machine," and "Exhibit A, E. B. G., notary public." In each of the machines represented by said models I find substantially the same characteristics as in the Cawood machine, combined, arranged, and operating in substantially the same manner and adapted to the production of the same effect. I also deem it proper to say that I am aware that each of said machines contains what may be termed secondary peculiarities of construction, in which they differ from each other and from the machine represented in the drawing of the Cawood patent; but such secondary peculiarities do not change the construction of the press-blocks so as to make them substantially different from the press-blocks of the Cawood machine in any particular that I have mentioned as characterizing those press-blocks in my answer to interrogatory 3; nor do such secondary peculiarities change, in sub-

stance, the combination of the press-blocks with each other, which I have described in my answer to that interrogatory; but the said secondary peculiarities are in the nature of improvements upon the original Cawood machine represented in the drawings of the Cawood patent, and each of the machines represented by said models embodies all the characteristics of the Cawood machine as well as its own secondary peculiarities.

Cross-examination by J. M. Whipple, esq.:

1. X. Having in view the scope of the Cawood patent, do you understand it to be for a machine to be used for enclosing and holding
370 a section of a railroad-rail, as in a mold, excepting the part to be welded and reformed? If not, what do you understand to be the scope of the patent?

A I understand the scope of the patent to be a machine or combination of parts, the parts having certain peculiar characteristics, which I have stated in my answer to direct interrogatory 3, and being combined substantially as stated in that answer.

2. X. Please restate those peculiar characteristics.

A. The characteristics of the press-blocks are that their faces are parallel with each other throughout the extent, which presses upon the article when it is griped between them; that they are nearly as high as the rail to be operated upon, extending, as shown by the drawing of the patent, to the place of greatest breadth of the head, so that the crowning portion of the rail is left entirely exposed, and that space is permitted for the application of the swage and for the escape of any surplus material at the widest part of the head of the rail, over the upper edges of the press-blocks; also that the upper edges of the press-blocks embrace the under side of the head of the rail, so as to prevent it from spreading laterally, and also to form a mold for the patch in case the fracture to be repared extends into the lower portion of the head of the rail.

3. X. Please traverse downward on the rail you have entered upon, and describe the relation of the mold or press-blocks to the neck and flange of the rail.

A. The two faces of the press-blocks are described in the Cawood patent as shaped to fit the side of the rail when it lies across the anvil in its natural position.

4. X. What have you to say of the relation of the bottom of the rail to the press-blocks or anvil, as you traverse around the rail from either side?

A. I have to say this: that the combination of the press-blocks is such that when the rail lies in its natural position upon a seat between the press-blocks the latter grip it in that position, so that the rail
371 does not hang suspended from its head, but is supported simultaneously at two parts of its height, which are the under side of its base and the under sides of its head.

5. X. Then your answer to the first branch of the first cross-interrogatory is yea, is it?

A. No; it is not.

6. X. Why not?

A. Because the true answer to that interrogatory is the one I have given, and because a simple answer yea to that interrogatory would not be a true one.

7. X. Why not a true one?

A. Because it would not express the fact as to the operation of the machine.

8. X. Why would it not?

A. Because in the operation of repairing rails it often happens that the part to be welded and re-formed extends below the upper edges of the press-blocks, and, therefore, would not come within the exception which qualifies the first branch of cross-interrogatory.

9. X. If the fractured part of the rail were above the top of the press-blocks, would the operation then be true; that is, in this state of the case, would your answer to the first cross-interrogatory be yea?

A. The first branch of this question I do not understand, nor do I understand the latter part, as it refers to the previous branch.

10. X. Assume that there is no occasion in repairing a railroad-rail to repair a fracture that extends below the top of the press-blocks, would your answer then to the first cross-interrogatory be yea?

A. I suppose that I am expected to assume the assumption stated in the question in place of the assumption given in the words "excepting the part to be welded and re-formed," written in cross-interrogatory 1. Under this supposition I may state that an answer yea, to cross-interrogatory 1, so amended, would not be a correct one.

372 11. X. Why not?

A. For several reasons; one of which is that cross-interrogatory 1 inquires whether the patent is for a machine to be used for enclosing and holding a section of a railroad-rail as in a mold. Now a mold is an instrumentality for enclosing all sides of an article, so that an article may be formed by casting a fluid material into the cavity of the mold; consequently, if the Cawood patent were for a machine for enclosing a section of a railroad-rail, as in a mold, it would be for a machine which entirely enclosed the rail and prevented you from getting at any part of it for the purpose of applying a patch or of operating upon it.

12. X. You say "for several reasons." If you have others, please state them.

A. The other reasons may be summed up briefly in my answer to cross-interrogation 1, which I will repeat if desired to do so.

13. X. Does not that interrogatory define the significance attached to the word mold by the words "excepting the part to be welded and re-formed?"

A. That interrogatory does, but that assumption was expressly excluded, as I understand the matter, by cross-interrogatory 10.

14. X. With this explanation as to what significance to give to the word "mold" in this instance, is your answer to the first cross-interrogatory yea?

A. I don't understand the question.

15. X. Assume, for the elucidation of the first cross-interrogatory, that the top of the mold, so called, embraces all of the rail except the fractured part, do you understand the Cawood patent to be a machine for enclosing and holding a railroad-rail, excepting the part to be welded and re-formed?

A. The question does not convey any definite idea to my mind. If the counsel will present me with a model or drawing of the mold he refers to, and will base his questions upon it, I will endeavor to answer it.

373 16. X. Witness is here presented with model marked "Ills. C. R. R. Co. Machine," with a rail, marked "Exhibit 1, P. A. Hoyne," inserted between the jaws or press-blocks of the machine, and is asked whether he understands the scope of the Cawood patent to be for a machine the jaws and anvil of which entirely enclose the rail to about the

center of the head, as shown in the model, and is such machine for the purpose of holding the rail in the process of welding and re-forming?

A. No; as I have already stated, the scope of the patent is not "a machine," by which I understand any or every machine capable of being used for the purpose specified, but is a combination of certain parts having certain peculiar characteristics, all as stated by me in my answer to direct interrogatory 3. Moreover, the scope of the patent is not a machine "the jaws and anvil of which entirely enclose the rail to about the center of the head," as I understand the meaning conveyed by this language, because, as I understand that language, it conveys to my mind that both the sides and ends of the rail are to be enclosed up to the place mentioned; for, otherwise, the enclosure could not be entire up to that place, and in such case the machine would have to be longer than a rail, and would have to be provided, in some manner or other not mentioned in the question, with means for enclosing the ends of the rail as well as its sides.

17. X. Is the patent for a combination of parts to be used for enclosing and holding a section of a railroad-rail to be welded and re-formed?

A. No.

18. X. Give your reasons for such answer.

A. The language, "a combination of parts," in the question, is indefinite, and is broad enough to include any and every combination capable of being used for doing the work recited in the question. Now, I have already stated, in substance, that the patent, as I understand it, is for a combination of parts having certain peculiar character-
374 istics combined in a certain manner. I may further state that a section of a rail could, as I understand the meaning conveyed by the term "enclosing," be enclosed only by being surrounded at the top, bottom, sides, and ends, and the patent is not for a combination of parts used for "enclosing" a section of railroad-rail.

19. X. It is for a combination of parts, viz, *namely:* an anvil, a fixed and movable press-block, and for enclosing the rail at the bottom and the sides to about the center of the crown of the rail, and for holding the same while it is being welded and re-formed?

A. The expression "a combination," in the question, is indefinite, and, when taken in connection with the residue of the question, conveys to my mind the idea that I am asked whether the combination of the parts mentioned is a combination of any kind of anvil and any kind of fixed and movable press-blocks for enclosing the rail at the bottom and sides to about the center of the crown of the rails, and also whether the combination is any combination of such parts, even if that combination be substantially different from the one described in the Cawood patent. Now, I have already stated, in substance, several times in the course of this examination, that the patent, as I understand it, is for a combination of two press-blocks having certain characteristics, in a certain manner; and it is not, as I understand the matter, for any combination of any kind of an anvil, of any kind of a fixed and movable press-block, by which a rail can be enclosed at the bottom and sides to about the center of the crown of the head.

20. X. Is not the Cawood patent for the combination of parts, viz, an anvil and two press-blocks for enclosing a section of the rail at the bottom and sides to about the center of the crown of the rail, and for holding the same while it is being welded and re-formed?

A. It is for the combination of the press-blocks described in the patent, and in the manner described in the patent, and one of the func-
375 tions of the combination is to enclose a section of the rail at the

bottom and sides to about the center of the crown of the rail, while at the same time the ends of the section are not enclosed, and the crown is exposed, so that the patch can be applied and the proper tools used for re-forming the rail.

21. X. Is it also a function of the combination to hold the rail while it is being welded and re-formed?

A. It is.

(Signed) E. S. RENWICK.

A true copy of deposition taken by me 26th August, 1869.

Attest:

N. AUSTIN PARKS,
Notary Public.

United States circuit court, northern district of Illinois.—In equity.

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL RAILROAD COMPANY ET AL. } And in other cases, as per stipulation.

Present: Complainant in person, Walter Curtis, esq., for complainant, and S. M. Whipple, esq., for respondents.

HERVEY WATERS.

HERVEY WATERS, produced at Boston, Mass., August 25th, 1869, by complainant, being duly sworn, doth depose and say, in answer to interrogatories propounded to him by Walter Curtis, esq., as follows, viz:

1. State your name, age, residence, and occupation.

A. Hervey Waters; age, sixty-five years; residence, Boston, Mass.; occupation, machinist. I have been for twenty years past accustomed to the examination of patents for inventions connected with machinery, and testifying in regard to the modes of operation of machines in the trial of patent cases.

376 2. Please state whether you have examined the letters-patent of Joseph D. Cawood for an improved anvil or swage-block, for the purpose of welding up and repairing the ends of railroad rails, or a duly-certified copy thereof.

A. I have.

3. Are you familiar with the machine described therein? And, if so, please state the parts of which the machine is composed, the functions of the respective parts, and the method by which those parts are combined and operated.

A. I am familiar with the machine and its mode of operation. The Cawood machine is made up substantially of two jaws and an anvil, with the auxiliaries for working the same. The anvil may rest upon any suitable supports. The jaws are furnished with a device for closing them readily upon the rail, so as to hold the rail firmly between them, while at the same time the bottom of the rail rests upon the anvil, thus supporting the rail while hot, to prevent any essential change in its configuration under the blows of a hammer, for the purpose of welding a patch upon the rail. The jaws fit the rail upon its side in all its parts above the base and up to about the center of the crown of the rail. From that upward the jaws do not extend, nor is there any obstruction to prevent placing a patch in its position and striking the patch with the

hammer after it is in position; so that the parts of the machines and their functions are two jaws, made to fit the rail upon its sides, with suitable apparatus for closing them readily on the rail, an anvil for supporting the bottom of the rail and the jaws, all so organized as to allow the patch to be conveniently placed and welded upon the rail while it is held between the jaws and upon the anvil, the anvil supporting the rail under the bottom, and the jaw supporting the rail under its crown; the jaws also, if need be, serving as a die to form correctly such part of the patch as may come down upon them in the operation of welding, and swaging off the rail after the welding.

377 4. State whether you are familiar with the process of welding and forging the sockets of bayonets, and how long have you been so, and in what manner did you acquire your knowledge; whether you are familiar with the machine for that purpose in use at Springfield, and which is now before you, and whether you find in that machine substantially such parts as are in the Cawood machine, arranged and combined in the manner pointed out in Cawood's patent, and adapted to produce the result effected by the Cawood machine; and, if not, please explain fully the substantial differences between this machine and the Cawood machine in these respects.

A. I am familiar with the process inquired of, and have been so long as the process has been used. I remember very well the process used before this at Springfield, and at the private armories in this country. I became acquainted with the manufacture of muskets in my boyhood, during the last war with Great Britain, at which time my father and others made muskets at Sutton in this State, now Millbury; and I have been acquainted with the operations at Springfield since I was twenty-one or twenty-two years of age, from having been frequently there.

The bayonet-machine inquired of is essentially different from the Cawood machine. The bayonet-machine has two jaws, resting upon any suitable support having sufficient inertia to sustain the jaws under the blow of the hammer for welding and shaping the socket. The jaws themselves come quite together, and may or may not pinch upon the neck of the bayonet; and when so together, they constitute the anvil upon which the work is done; the bayonet having no support except the jaws and required none in the process of welding; while in the Cawood machine the jaws do not come together at all, but always pinch upon the rail, while the base of the rail has a secondary support upon an anvil below, which cannot be dispensed with in repairing the rail; and both the jaws and the anvil having such relations to each other that the form of the rail in cross-section shall be maintained, notwithstanding the violence of any blows that may be put upon it for the purpose of welding.

378 5. Whether or not you are familiar with the machine used in the making and forging of angle-iron for the frames of locomotive-engines, a model of which, marked "Angle-iron Machine," is now before you; and whether you find in that machine substantially such parts as are in the Cawood machine, arranged and combined in the manner pointed out in Cawood's patent, and adapted to produce the result effected by the Cawood machine.

A. I am familiar with the machine for forging angle-iron for the frames of locomotive-engines, represented by the model, which machine was used at Cincinnati, as described by Mr. Greenleaf, at the trial of a case at Chicago some two years ago, at which time I was present and heard Mr. Greenleaf's explanation of his contrivance; but I do not understand that this is the usual way of making angle-iron for the

frames of locomotive-engines. I do not find this machine substantially like Cawood's. Some of the parts are similar to Cawood's. The part most like Cawood's is the cam and lever for working up the clamp to the side of the anvil in the Cincinnati machine, which resembles, in the mode of operation, the manner of working up one of the jaws of the Cawood machine; but the angle-iron machine as an entirety is entirely different from the Cawood machine as an entirety. The angle-iron machine is made up of a common tilt-hammer, and its anvil furnished with a clamp for holding one part of the iron up to the side of the anvil, which clamp is worked up and held up by the cam and lever before mentioned or referred to. There are, in fact, two clamps, one to each side of the anvil, and each clamp*ed* worked up by a cam and lever, as before described, but never more than one of those clamps is used at a time, there being two for the convenience of working either branch of the angle-iron without the necessity of changing the bar from end to end. Comparing, now, the Cawood machine with this angle-iron machine, I find the Cawood machine made up of an anvil and two jaws, constituting a sort of a secondary anvil, so as to support the rail under its bottom and under its crown, the whole making a com-
379 pound anvil, upon which and in which the rail is held in the process of welding a patch upon it, and shaping off the rail after the welding; while the angle-iron machine has simply an anvil with a clamp for holding the work up to it, the clamp having no other function, and the work always being done upon the top of the anvil, and, perhaps, upon the rounded corner of the anvil in shaping off after the welding is done. The welding is always done entirely from the top of the anvil. And, moreover, in the Cawood machine the entire cross-section of the rail is under the action of the hammer at the same time, while in the angle-iron machine only half, or perhaps a little more than half, of the cross-section of the bar is under the action of the hammer at any one time, the other half of the bar at the same time being under its bottom, substantially free to descend when the blow is struck. This is an essential feature in the contrivance, for if the half last referred to was made to rest down upon a secondary anvil, the operation would be ruined, while in the Cawood machine, if the bar does not rest down, the work will be ruined.

6. Please state whether you have examined and are familiar with the description of the machine described in letters-patent, granted in England to Wm. Church, in the year 1846, for stamping, flattening, and shaping metals, and especially the machine as represented by Figures 33 and 34 of the drawings annexed thereto, a copy of which is now before you, and whether you find in that machine substantially such parts as are in the Cawood machine, arranged and combined in the manner pointed out in Cawood's patent and adapted to produce the result effected by the Cawood machine.

A. I am familiar with the description, having had occasion to examine it thoroughly, and especially as represented in the drawings referred to. I find the machine described by Church entirely different from the Cawood machine. It can't be used at all for fixing rails as the Cawood machine is used, and I doubt very much whether it is practical for any purpose.

380 7. State whether you find in the machine, as represented by Figures 12, 13, and 22 of the drawings annexed to the said patent, substantially the same parts as in the Cawood machine, adapted for the purpose of the Cawood machine.

A. I do not.

8. State whether drawings 33 and 34, above referred to, are represented by the model marked "Church Machine," now shown you.

A. They are substantially, I believe.

9. State whether you have examined a certified copy of letters-patent granted to Lyman Beebe and George F. Smith, June 9, 1857, and are familiar with the machine described therein, a model of which, marked "Beebe & Smith, patent, June 9, 1857," is now shown you, and whether you find in the said Beebe & Smith machine substantially the same parts as in the Cawood machine, combined in substantially the same manner and adapted to the production of the same effect.

A. I have examined the letters-patent and am familiar with the machine inquired of. I find substantially the same parts in this machine as in the Cawood machine, combined substantially as in that machine and adapted to produce substantially the same effect. There are specific differences, but they do not go to alter the character of the machine, in my judgment. In this contrivance of Beebe & Smith the jaws are made to bite upon the rail partly by their own weight, partly by the weight of the rail itself, and partly by the blows of the hammer on the rail in doing the work; but the rail is supported in the compound anvil substantially as in the Cawood machine, to all intents and purposes. In the Cawood machine the anvil, upon which the bottom of the rail rests, is attached entirely to one jaw of the machine; while in the Beebe & Smith machine one-half of the anvil is attached to each jaw, but that don't change the character of the machine any, in my judgment.

10. Please examine the models now shown you, marked respect-
381 ively "Exhibit A, E. B. G., notary public," and "Whitcomb Machine," and state whether you find in the machine represented by those models substantially the same parts as in the Cawood machine, combined and arranged in the manner pointed out in Cawood's letters-patent, and adapted to produce the result contemplated in the Cawood machine.

A. I do.

11. Please examine the model now shown you marked "Etheridge Machine," and state whether you find in the machine represented thereby substantially the same parts as in the Cawood machine, combined and arranged in the manner pointed out in Cawood's letters-patent, and adapted to produce the result contemplated in the Cawood machine.

A. I do.

12. Examine the model now shown you, marked "Ill. C. R. R. Co. Machine," and state whether you find in the machine represented thereby substantially the same parts as in the Cawood machine, combined and arranged in the manner pointed out in Cawood's letters-patent, and adapted to produce the result contemplated by the Cawood machine.

A. I do.

Cross-examination by S. M. Whipple, esq., for defendant:

1. X. You say you have examined the Cawood patent. Please define in detail the scope and limitations of the patent, and then state concisely what is new in the patented machine.

Adjourned to 2.15 o'clock p. m.

Resumed:

A. If I understand the question, the first branch of it calls for a construction of the Cawood patent, which I do not consider myself competent to give, because I consider that a question of law, not coming within the province of an expert in mechanics. But I understand the scope of the patent generally to be to give to the patentee or his assigns

the exclusive use of the machine described therein, or any other
382 machine constructed substantially in the same manner, and operating in substantially the same manner, for substantially the same purpose, for the term of fourteen years from the date of the patent. As to what is new in the patented machine, I accept, generally, what the patentee says in his patent. He says he has "invented a new and useful improvement in the common anvil or swage-block for the purpose of welding up and re-forming the ends of railroad-rails." He then goes on to say, "the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawing making part of this specification, and giving a perspective view of the machine: A representing the bed-sill on which the anvil is placed; B, the anvil or swage-block of cast iron; C C, recesses or dies across the face, the shape of the side of the rail; D, solid block, making a part of anvil, with its side shaped to the side of the rail, while placed in its natural position; E, a moveable press-block, held down to anvil by dove-tailed tongues, *a*, on the anvil and grooves in the move'ble press-block, and operated by two eccentric cams, F, back and forth in a longitudinal direction, to press the rail together while forming its end, and with sufficient travel to extricate the rail without altering its vertical position; G, a rail of the T-form, in its position between the press-blocks." He then says, "I usually make my improved anvil and swage-block of cast iron, between four and five feet long and sixteen inches wide across the face, with two forms or recesses, C C, at one end, right and left, of a form corresponding with the sides of the rail. Close to these is cast a raised block, D, nearly as high as the rail, and with its farther*e*st edge also shaped to fit the sides of the rail when it lies across the anvil in its natural position. Next this I attach to the face of the anvil, by dove-tail tongues and grooves, or any other convenient manner, what I call a movable press-block, E, with a similar but reverse-shape edge lying opposite the other, so as to enclose the rail between the two as in the jaws of a vise.
383 This block I work by two eccentric cams, F, on a shaft which is attached to the anvil by two standards, H H, with bearings I I, either cast on or bolted to the edge of the same, so that half a turn of the crank will move the press-block over a space a little more than the extreme width of the rail." The patentee then goes on and describes the manner of working the contrivance. Now, I understand that this machine, as a whole, was new with Cawood in making this invention. I also understand that the old swage-block, which is embodied in the machine and represented in the drawing at C C, is no part of the machine patented. Leaving them out, what remains of the machine is represented in the drawings by D and E and the attachments for working up the jaw E and retaining it in its position. Now, B, C C, and D are all upon the same piece, as represented in the drawings and description of the machine, and if C C be cut off as not essential to the machine there still remains the two pieces D and E, the connections of E to D, and the means of working E up towards D to hold the rail; and that is all. Now, all this part of the machine except C C, when constructed as described and operating as described, I consider new in this contrivance.

2. X. Then the invention is for a purpose, is it? viz, for the purpose of welding up and re-forming the ends of railroad-rails.

A. I don't think that's quite it. I think the invention constitutes a machine for the purposes supposed in the question.

3. X. Please look at the "Church" machine and then at the Cawood

machine, and state what is new in the latter when compared with the former.

A. When compared with the Church machine, what is new in the Cawood machine is the two pieces D and E, the connections of E to D, and the means of working E up towards D, to hold the rail, when operated as described in the Cawood patent, the same as I said in my last answer.

4. X. Now look at the bayonet-machine, the iron machine, and
384 compare it with the Cawood machine, and state what is new in the latter.

A. The same as contained in my last answer.

5. X. And do you make the same answer in comparing the angle-iron machine with Cawood machine, i. e., the novelty consists in the two pieces D and E, the connections of E to D, and the means of working E up towards D, to hold the rail, when operated as described in the Cawood patent?

A. I do, always understanding that the piece D constitutes one jaw and the anvil proper of the machine, and that D and E, with the apparatus for working E upon D, constitutes a compound swage-block, which I understand to be new, notwithstanding any of the other machines referred to as having gone before it.

6. X. Then the novelty of the Cawood machine consists, does it, in adpating the jaws of the machine to the rail to be held while in the process of re-forming?

A. No; it does not.

7. X. Why not?

A. Because the patentee did more than that.

8. X. How much more? Please state fully.

A. He contrived such a machine as is described in his patent, which consists, as I have said before, in a compound swage-block, consisting of two jaws upon an anvil, with the means of working the jaws to and from each other so as to support the rail under its bottom, and under the cheeks of the cap of the rail, during the operation of welding on a patch, and reshaping the rail after the patch is welded on. The mere shaping to fit the rail was in the old swage-block, as represented in Cawood's drawings at C C. His invention consists, broadly, not in the shaping of C C, but in so placing C C upon an anvil in such relation to the anvil and in such relation to each other that the rail is held firmly in one position and there kept in form, instead of the two dies,
385 C C being used as before merely for re-forming the rails, the welding having been previously done upon a common anvil.

9. X. Setting aside the mechanism for operating the movable press-block E, and the recesses C, C, is not the patent narrowed down to a mere conformation of the jaws D and E to the rail D?

A. It is, and to less than that. The contrivance would be perfectly inoperative, and of no use whatever, so far as I can see, and to fix a rail you would have to go back to the old swage-block and anvil.

10. X. Is the mechanism for operating the movable press-block E part of the patent?

A. I can't say. I think that's a question of law. I know it is a part of the contrivance, and that the continuance is perfectly inoperative without it.

11. X. Then, you understand the invention described in the Cawood patent to be the machine described by him, not including the grooves C, C, as a part of the invention?

A. I do.

12. X. Please look at the angle-iron machine and state what parts or elements you find in it essentially the same as seen in the Cawood machine.

A. I find in it a cam to be worked with a lever for working up a clamp, which, taken by itself, in its mode of operation, is similar to the cam used in the Cawood machine for working up a jaw, as stated by me in my direct examination.

13. X. Any other similarity?

A. I don't recollect any other.

14. X. Isn't there in the angle-iron machine an anvil, D, and bed, B, to which it is attached, forming one piece?

A. No. There is an anvil and bed forming one piece, but is not like D, in the Cawood patent.

386 15. X. What modification in the angle-iron machine is necessary to make it, for all practical purposes, a Cawood machine?

A. It is necessary to make it like the Cawood machine, which I have seen done with a machine introduced on the trial of the merits of the Cawood invention at Chicago. The changes were these: The anvil upon which the work was done in the angle iron machine was taken from it' position and placed in another position in this way: the side of the anvil was cut to the shape of a rail, and so cut out as that the rail could rest upon the anvil, which would then be between where the anvil was before the clamp. What was the clamp, before, in the angle-iron machine, was cut to the shape of one side of the rail. These were placed in such relation to the bed or anvil as to allow the rail to rest down upon the bed at that point in the contrivance where the angle-iron did not rest, and could not rest, without ruining the operation of the machine. After these alterations were made, what was the anvil in the angle-iron machine became a jaw of the Cawood machine, and that part of the angle-iron machine which was not the anvil, and could not serve as an anvil, without destroying the operation of the angle-iron machine, became the anvil proper of the Cawood machine. That piece which was the clamp in the angle-iron machine became the movable jaw of the Cawood machine, so that when the machine was thus reconstructed it was the Cawood machine, to all intents and purposes.

(Answer objected to for the reason that the angle-iron machine referred to, modified into a Cawood machine, is not correctly represented, as in an important and essential particular will appear by the production of this machine on the trial of this case.)

16. X. Look at the iron bayonet-machine and state what modifications are necessary to convert it into a Cawood machine.

A. It would be necessary to reconstruct it and make it like the Cawood machine. It is not as much like it now as a common iron vise is.

387 17. X. Have you seen a bayonet-machine converted into a Cawood machine? If so, please describe the same.

A. I never have, and don't expect to.

18. X. Have you seen what purports to be such a machine? and, if so, please describe that.

A. Not that I know of.

19. X. Did you not see in the court-room at Chicago, in October, 1867, a bayonet-machine modified into a Cawood machine?

A. I did not.

20. X. Anything purporting to be such modification?

A. No, I did not, that I recollect. But I do recollect seeing a machine there which it was said had been used for repairing rails, and that

some people there, of a lively imagination, called it a "bayonet-machine," but, as well as I remember, it was neither a bayonet-machine nor a Cawood machine. It was so constituted as to pinch a rail under its crown, but had no anvil proper. A couple of Irishmen were introduced as witnesses to prove the use of it in fixing rails, and, as well as I remember, they testified to using it some four hours or so with what they called good results. There was no evidence introduced, that I remember, in regard to the rails after they were so fixed, whether they could be used or not. My opinion then was, and now is, that that machine was good for nothing for the purpose of repairing rails, and whether it was good or not, it was unlike Cawood's machine, and unlike the bayonet-machine, both in construction and mode of operation for either the purpose of making bayonets or for the purpose of repairing rails.

(Answer objected to for reasons that will be given on the trial of this case.)

21. X. In the practical operation of the Cawood machine, do you deem it essential that the bottom of the rail should rest on the anvil?

A. I do.

388 22. X. Would the use of any machine in which the bottom of the rail did not rest on the anvil be an infringement of the Cawood machine?

A. I think that's a question of law. But my opinion is, that if you take the anvil out of the Cawood machine, and have the rail rest merely upon the jaws of the machine, the utility of the machine will be substantially destroyed, and the novelty also, except in some of the mere devices of the contrivance. What I mean to say is, that if that part of the machine upon which the rail rests at the bottom were removed, the machine would then be broadly and substantially like a common vise, so shaped in the jaws as to fit up under the crown of the rail, which shaping would not constitute an invention, in my judgment.

23. X. Then it is your opinion, is it, that if that part of the anvil upon which the rail rests, leaving the jaws to pinch the neck and support the crown, be dropped out, the bottom drops out of the Cawood patent?

A. I don't care to assume all that. What I mean to say is, that, in my judgment, such a patent would be void for want of novelty; and, moreover, that such a machine would be good for nothing for the purpose of repairing rails.

Direct examination resumed:

And in answer to the direct examination resumed, deponent saith:

13. Please examine the model now shown you, marked "Wooden Bayonet-Machine Model," and state whether it is a correct model of a complete bayonet-machine.

A. It is a correct model of a bayonet-machine complete, but no part of the wooden model contains the bayonet-machine referred to in my examination thus far. There is under the trip-hammer in the wooden model a contrivance generally, substantially like the iron machine to

389 which I have referred, and the mode of operation of the two contrivances is substantially the same; that is to say, the iron machine is used with a trip-hammer in the forging of bayonets, substantially as the machine shown in the wooden model is used; but the iron machine, as I understand it, is used for welding the socket after the plate for the socket is welded onto the blade. The machine represented in the model is for welding the plate for the socket onto the blade and to reducing it to a thickness.

14. Examine model now shown you, and marked "J. D. Cawood's patent, Sept. 9, 1856," and state what it is.

A. It is a representation of the description of the machine in Cawood's patent.

15. Would it be possible for a skilful mechanic to construct from the description contained in the letters-patent to Wm. Church, and the drawings annexed thereto, a machine the same, or substantially the same, as the Cawood machine in construction and mode of operation, without the exercise of invention?

A. It would not.

16. Would it, in your judgment, have been possible to have welded up and re-formed upon the angle-iron machine, prior to its alteration and re-formation, as testified to by you in your answer to 15th cross-interrogatory, railroad-rails; and would it have been possible to have welded angle-iron upon that machine, after the alterations you have testified to had been made in it?

A. I answer no, to both branches of the question.

17. If the machine, referred to in your answer to the 20th cross-interrogatory, as seen by you at Chicago, in October, 1867, had jaw-faces fitted to the sides of the rail, and of such dimensions as permitted the rail to rest upon the bottom, as the anvil, would the machine then have been the Cawood machine?

A. It would.

Cross-examination resumed:

24. X. Cannot railroad rails be repaired in the Cawood machine with or without a trip-hammer?

390 A. They can.

25. X. Does a machine constructed in all respect' like the Cawood machine, with the exception that the part of the anvil upon which the bottom of the rail rests is removed, so as not to give support to the under side of the rail, come within the Cawood patent?

A. That question substantially has been answered once in the course of this cross-examination. Whether it would come within the patent, I said was a question of law that I didn't feel competent to answer. But I have said, in the course of this examination, and I now say again, that such a machine would be good for nothing, in my judgment. And I have also said, and I now say, that a patent for such a machine would be void for want of novelty, in my judgment.

26. X. Then your answer to the question is yea, is it not, or nay?

A. I have no further answer to make to the question.

Direct examination resumed:

And in answer to direct examination resumed, he saith:

18. If the bottom upon which the rail rests was removed so that the bottom of the rail would not come in contact with it, and a piece was subsequently inserted between the bottom of the rail and the top of the cut, so as to support the bottom of the rail upon that piece, would it then be the Cawood machine?

A. It would.

19. State whether you have witnessed an experiment of mending railroad-rails in a machine, the bottom of which had been cut away so as no longer to support the bottom of the rail; and, if so, what was the result?

A. I have witnessed such an experiment, made under my directions. The result was that the rails became disfigured, and sometimes split in the neck.

391 Cross-examination resumed:

27. X. Did this splitting in the neck take place when the attempt was made to cut off the rail placed between the jaws?

A. It did; but that cutting off is a part of the legitimate use of the machine, and has nearly always to be done in shaping the rail after the patch is welded on.

28. X. Then, the splitting and disfiguration of the rail did not take place in the process of welding, did it?

A. The splitting did not; part of the disfiguration did. The rail was driven down through between the jaws, and made wider in the process of welding.

29. X. When and where did you observe this process of welding?

A. About two years ago, at Chicago.

30. X. At what shop?

A. At the shop of a machinist there, whose name I do not recollect. The experiment was made at my suggestion and under my direction by men accustomed to the use of the machine, and instructed by me to proceed as usual with the repair of the rails, with the exception that the bottom had been taken out of the machine, at my suggestion.

31. X. Was the experiment made at the shop of the Illinois Central R. R. Co., at Weldon Station?

A. Of course not. It was made at the shop of a machinist, in Chicago, as I have stated.

32. X. By what mechanism was the movable jaw operated in which you made this experiment?

A. By rack and pinion; the pinion worked with a level.

(Signed) HERVEY WATERS.

A true copy of depositions taken by me August 25, 1869.

Attest:

N. AUSTIN PARKS,
Notary Public.

392 *Depositions of parties using the old swage-block in repairing railroad-rails.*

SAMUEL H. TURRILL ET AL.
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY. } And in other cases, as per stipulation.

On the 16th day of August, A. D. 1869, at Hartford, Conn., the deposition of Eli H. Perkins was taken in said cases, on the part of the complainant, under the stipulation aforesaid; the parties appearing, etc., as follows:

Present: Complainant in person, and S. M. Whipple, counsel for the defendant.

ELI H. PERKINS.

Personally appeared before me, George G. Sill, a notary public in and for the State of Connecticut, at my office in the city of Hartford, in said State, on the 16th day of August, A. D. 1869, at 2 o'clock p. m., Eli H. Perkins; and the said Perkins being carefully examined and cautioned and duly sworn to testify the truth, the whole truth, and nothing but the truth, saith, in answer to the following interrogations:

1. Int. What is your name, age, residence, and occupation?

A. My name is Eli H. Perkins; age, thirty-eight years; residence, Hartford, Connecticut; occupation, foreman of the blacksmith-shop of the Hartford, Providence & Fishkill Railroad Company.

2. Int. How long have you been such foreman?

A. Four years.

3. Int. Do they repair railroad-rails, and do you have charge of the same?

393 A. They do; and I have charge of the same.

4. Int. What kind of block do you use in making the repairs?

A. It is a plain cast-iron block, about two feet square and five inches thick, with a swage on the top fitted into the block, marked "Swage P;" in the model shown, marked "Common anvil."

5. Int. State the process by which you prepare and repair the rail.

A. We first load the rails upon a dumpy car, and roll them into the shop, and then they are put into the crane, and then into the furnace; they are then heated and scarfed, then put them again into the furnace with another small piece or patch to be welded to the rail when they are both heated welding-hot, and then they are taken out and put upon the anvil, above mentioned, for the purpose of sticking on the patch; then they are put back into the fire for another welding heat; then taken out and the patch welded on, on the anvil described above. If the patch projects beyond the end of the rail it is cut off with a chisel; then the patch is butted back, to make a sure weld, and then put into the furnace for a light welding heat on the end; then taken out and finished off by using the swage and a flatter on the top. This ordinarily completes the process; but sometimes they have to be heated again in order to full them up.

6. Int. How many rail-fires have you in your shop?

A. We have two that are now running.

7. Int. How many men are employed at each fire?

A. Three men; a foreman and two helpers.

8. Int. Do you keep an account of the number of rails repaired at each fire per day?

A. We do; and render an account each month.

9. Int. Have you kept an account of the number of inches and feet repaired per day, or month? If so, for how long, and what was the amount of work done while you kept such record?

394 A. I kept an account of the number of rails repaired in twenty-seven days at one fire, which was two hundred and fifteen, (215;) the number of feet repaired in them was one hundred and thirty-four and six inches, (134½;) this was in February, 1869. I also kept an account in the month of March, 1869, for twenty-two days. In that time one hundred and seventy-eight (178) rails were repaired, and one hundred and two (102) feet.

10. Int. What was the average number of rails repaired per day, and average amount of repairing on the rails?

A. Average number of rails was (8) eight, and about eight (8) inches on each rail.

11. Int. What was the average number of feet repaired per day in February, 1869, and March, 1869?

A. Five feet and two inches in each month.

12. Int. What amount and kind of coal do you use at each fire per day? What kind of fire do you use, and what is the cost of the coal per ton?

A. Use Lehigh coal, and about three hundred and seventy-five or

eighty pounds per day at each fire. We use the fan-blast, driven by steam-power. The coal costs about eight and one-half to nine dollars per ton.

13 Int. What is the size of your patch-iron, and how much do you use per foot; and cost of the same per pound?

A. The size is two inches and one-quarter by three-eighths, ($2\frac{1}{4} \times \frac{3}{8}$;) it costs five cents per pound.

14. Int. What wages do the foreman and helpers each receive per day?

A. The foreman, two dollars; one helper, one dollar and a half; one, one dollar and a quarter; all, four dollars and seventy-five cents, (4.75.)

15. int. How many hours do you work per day?

A. Ten hours.

395 16. Int. Did you do as much work during the time you kept the above account in February and March, 1869, as you did in other months previous and since?

(Objected to by defendant's counsel.)

A. Did more work than we did previously, but no more than we have done since.

17. Int. Have you an account of the number of rails repaired each month for several months, and the number of days' work in said month?

A. I have an account for the months of December, 1868, January and April, 1869:

In December, 304 rails and 38 days' work.

In January, 346 rails and $35\frac{1}{2}$ days' work.

In April, 209 rails and $47\frac{3}{4}$ days' work.

18. Int. Who did the work at the time this account was kept, and was it all done at one fire, and by the same men?

A. The work was done by Philip Hauselling, foreman, and two helpers, in February and March, 1869.

19. Int. Did he keep the account and hand it over to you, as foreman of the blacksmith-shop?

A. I kept the account myself, and know it to be correct.

Cross-examination.

1. X Int. What other work did your men do during the day besides repair rails?

A. They did no other work while they were at work on this lot of rails. Loading and unloading are included in the account of their time.

2. X Int. Were you to take the job of repairing the rails of the Providence, Hartford & Fishkill R. R. Co. at so much per rail, or so much per inch or foot, would you employ men to do your work who could not turn off over five or six feet per day or from seven or eight rails per day?

396 A. I do not know that I could do any better, whether it was done by the job or by the day. I do not know that any men could do more than they did.

3. X Int. Could not you and two helpers turn off more than five or six feet per day of ten hours?

A. I do not think I could do as much.

4. X Int. You are a blacksmith by trade, are you not, and foreman of shop?

A. I am.

5. X Int. Do you think there is any particular science in patching rail?

A. There is no particular science, but it requires practice, which a man can learn in a short time.

ELI H. PERKINS.

SAMUEL H. TURRILL ET AL.
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY. } And in other cases as per stipulation.

On the 16th day of August, A. D. 1869, at Hartford, Conn., the deposition of Henry Foster was taken in said cases on the part of the complainant, under the stipulation aforesaid; the parties appearing, etc., as follows:

HENRY FOSTER.

Personally appeared before me, George G. Sill, a notary public in and for the State of Connecticut, at my office in the city of Hartford, in said State, on the 16th day of August, A. D. 1869, at 2 o'clock p. m., Henry Foster, and the said Foster being carefully examined and cautioned, and duly sworn to testify the truth, the whole truth, and nothing but the truth, saith, in answer to the following interrogations:

1. Int. What is your name, age, residence, and occupation?

397 A. Name, Henry Foster; age, fifty-three; residence, Hartford, Connecticut; occupation, a pattern-maker. I am a blacksmith and joiner by trade.

2. Int. How long did you work at blacksmithing, and at what places?

A. I worked at it twenty-five years, in Providence, Hartford, and New Bedford, where I learned my trade.

3. Int. At what kind of blacksmithing did you work, and for what companies?

A. At Providence, in repair-shop of Providence & Worcester Railroad Company, and in Hartford, at the repair-shop of the Hartford, Providence & Fishkill Railroad Company.

4. Int. Did you ever repair railroad rails; and, if so, by what process?

A. I have repaired rails by a common blacksmith's anvil and open fire.

5. Int. Have you repaired rails when they used the anvil marked "Common Anvil?"

A. I never have.

6. int. Have you ever had charge of a shop where they used the anvil marked "Common Anvil?"

A. I have, for eight or nine years.

7. Int. Did you keep an account of the number of rails repaired by this process? If so, when and where was the account kept?

A. I did keep an account of the number repaired; it was at the shop of the Hartford, Providence & Fishkill Railroad Company. I kept it about six years. I only remember certainly the years 1861, 1862, and 1863.

8. Int. Have you the book in which that account was kept? If so, what was the daily average of the number of rails repaired at one fire of ten hours?

A. I have the book, and the average number was about six and one-half rails per day of ten hours, at one fire.

9. Int. Have you examined and measured the amount of work

398 done on rails repaired at the shop of the Hartford, Providence & Fishkill Railroad Company within the last eight or nine months,

and how does the amount done compare with the amount done while you had charge of making the repairs?

A. I have measured the work, and it varies but little; but there is more work done now than when I had charge; the patches are larger.

10. Int. Have you an account of week's work done in October, 1868, by Philip Hauselling? If so, what was the number of rails repaired, feet patched, and coal used?

A. I have the account. Number of rails, thirty-five; feet repaired, twenty-four and eleven-twelfths; two thousand three hundred pounds coal used; eighty pounds iron used; average number repaired, per day, five and five-sixths; number of feet, four and two-twelfths per day.

11. Int. What kind of a fire did you use in 1861, 1862, and 1863, and kind of coal?

A. Used fan-blast and Lehigh coal; sometimes Lackawanna coal.

Cross-examination:

1. X Int. What led you to measure the work done at the Hartford, Providence & Fishkill Railroad Company's shop?

A. I was requested to do so by Mr. Turrill.

2. X Int. Do you know that Philip Hauselling performed the work that you say he did in the week above stated? If so, how do you know?

A. I cannot say that he did; he kept the account and gave it to the foreman, Mr. Perkins, and Perkins gave it to me. I know nothing of the accuracy of the account from my own knowledge.

3. X Int. Did you ever repair rails yourself on a block marked "Common Anvil?"

A. I never did; only on a blacksmith's anvil.

HENRY FOSTER.

399 SAMUEL H. TURRILL ET AL. *vs.* THE ILLINOIS CENTRAL RAILROAD COMPANY. } And in other cases, as per stipulation.

On the 16th day of August, A. D. 1869, at Hartford, Conn., the deposition of Philip Hauselling was taken in said cases, on the part of the complainant, under the stipulation aforesaid; the parties appearing, etc., as follows:

Present: Complainant in person, and S. M. Whipple, counsel for the defendants.

PHILIP HAUSELLING.

Personally appeared before me, Geo. G. Sill, a notary public in and for the State of Connecticut, at my office in the city of Hartford, in said State, on the 16th day of August, A. D. 1869, at 2 o'clock p. m., Philip Hauselling; and the said Hauselling being carefully examined, and cautioned, and duly sworn to testify the truth, the whole truth, and nothing but the truth, saith, in answer to the following interrogations:

1. Int. What is your name, age, residence, and occupation?

A. My name is Philip Hauselling; age, forty years; residence, Hartford, Conn.; occupation, "T" rail patcher.

2. Int. How long have you worked patching rails?

A. About eight years.

3. A. I have used block like the model marked "*O*ommon Anvil."

4. Int. Do you prepare the rails as stated by Mr. Perkins in his deposition?

A. I do.

5. Int. Are the accounts of the number of rails repaired and feet repaired in February and March, 1869, correct, as testified to by Mr. Perkins?

A. Yes.

6. Int. Is the account of the week's work, as testified to by Henry Foster, in October, 1868, correct in all respects?

400 A. Yes; I did the work and kept the account.

7. Int. During the time you kept these accounts, were you constantly employed in repairing rails?

A. Yes.

8. Int. What wages did you and the helpers receive?

A. I got $2.10 per day; one helper, $1.50; one, $1.25.

9. Int. What kind of fire and coal did you use?

A. Used fan-blast and hard coal.

Cross-examination:

1. X Int. Are you a blacksmith by trade?

A. I am not.

2. X Int. State the number of rails repaired by you in February and March, 1869.

A. I gave the number to Mr. Perkins. I cannot state the number.

3. Q. How many did you repair in the week in October, 1868?

A. I do not now remember.

4. Q. What amount of work can you do in repairing rails per day? State the average number and number of feet.

A. Somewhere about eight per day. Cannot tell how many feet. We do not keep an account of that.

Direct examination resumed:

1. Q. Do you keep an account of the number of rails repaired each month and give it to Mr. Perkins?

A. Yes.

2. Q. Do you have a book to keep it in, or keep it on a slate and draw it off and give it to Mr. Perkins?

A. Mr. Perkins takes it from a slate each month.

3. Q. How many heats do you require in repairing six to eight inches?

A. Four.

4. Q. What kind of hammers, and how heavy, do you use?

A. Two sledges and one hammer. Sledges, one fourteen pounds;

401 one five or six pounds. Hammer, two or two and one-half pounds.

5. Q. Do you use the heavy sledge to weld the patch on top of rail, or in fulling up?

A. Use in fulling up. Light sledge and hammer for welding.

6. Q. Is the rail very likely to get crooked in the neck when patching, or not?

A. They do sometimes; not all of them.

7. Q. Does the rail ever crack in the neck while being fulled to its proper weight?

A. They do sometimes.

Cross-examination resumed:

1. X Q. How often do they crack?

A. I cannot say how often. Not very often. Do not have to full them much; get the patch thick enough without.

PHILLIP HAUSELING.

I do certify that the foregoing depositions of Eli H. Perkins, Henry Foster, and Phillip Hauseling were taken and reduced to writing by me, at the time and place mentioned in the caption hereto, and that each witness was by me duly sworn, and that said depositions were taken to be used in the trial of the several causes herebefore mentioned; and I do further certify, Samuel H. Turrill, the plaintiff, appeared in person, and that S. M. Whipple, esq., appeared for each of the several defendants to cross-examine the witnesses produced on the part of the plaintiff.

In witness whereof, I have hereunto set my hand and seal, at Hartford aforesaid, this sixteenth day of August, A. D. 1869.

[SEAL.] GEORGE G. SILL,
Notary Public.

I hereby certify that the above and foregoing are true and
402 correct copies of the caption, depositions, and certificate taken by me in the above-entitled causes.

GEORGE G. SILL, *Notary Public.*

HARTFORD, *August 16th*, 1869.

SAMUEL H. TURRILL ET AL. } And in other cases as
vs. } per stipulation.
THE ILLINOIS CENTRAL RAILROAD COMPANY. }

On the 23d day of August, A. D. 1869, at Concord, N. H., the deposition of Greenough McQuesten was taken in said cases, on the part of complainant, under the stipulation aforesaid; the parties appearing, etc., as follows:

GREENOUGH MCQUESTION.

I, Greenough McQuestion, of Concord, in the county of Merrimac and State of New Hampshire, depose, testify, and say as follows, in answer to the following interrogatories:

1. Int. (By complainant.) What is your occupation, and how long have you been so employed, and for what railroad company?

A. I am what they call a time-keeper and clerk for the Concord Railroad Company, and have been so since October, 1853.

2. Int. Do you keep the books and accounts for said railroad? If yea, for what department?

A. I do; in the repair-shop. This includes the accounts of the rail-repairing at Manchester, the master-mechanic's department at Concord, and the wood departments. I kept the accounts of the rail-repairing department at Concord, when the rails were formerly repaired there.

3. Int. (By same.) Have you copies of said accounts of repairing rails? If yea, are they true and correct copies taken from the
403 books of the company during the time for which they purport to have been kept, in all particulars set forth in said copies; and if so, will you produce and annex the same to this deposition?

Ans. I have a copy of the account kept by myself in August, 1868, and as returned by Mr. Howe in October and December, 1868. Mr. Howe is foreman of the rail-repairing shop at Manchester. His full name is Isaac G. Howe.

They are true and correct copies, taken from the books of the company during the time for which they purport to have been kept, in all particulars set forth in said copies.

(They are produced and hereto annexed, marked I, J, and K, respectively, with the deponent's signature attached to each.)

Cross-examination:

1. X Int. (By S. M. Whipple, esq., counsel for defendants.) Do you know anything about the circumstances under which the labor in Exhibits I, J, and K were performed?

A. During the month of August I saw the workmen in the shop, when welding rails, from one to four or five times a day. Some days they would work all day; some days parts of days. The time they worked on rails was kept by hours, and condensed in the statement into days of ten hours each, as reported to me by the men who did the work. I can't say anything about the labor indicated by Exhibits J and K, except that it was reported to me by Mr. Howe.

2. X Int. (By same.) In Exhibit I, was there any account rendered to you of rails cut off or straightened?

A. My impression is there were fifty-six rails cut off.

3. X Int. (By same.) In this exhibit you render but seventeen and three-fourth days for the month of August. Were the twenty-six days, usually counted for a month, broken in from time to time by the hands being called off to do other work than rail-welding?

404 A. They were.

4. X Int. (By same.) When they returned to their work, then, they were obliged to spend a portion of the time, were they not, in getting their fires agoing, before they could do any work at welding?

A. I presume so.

5. X Int. Was any account rendered to you of the number of rails handled?

A. No further than the number repaired.

6. X Int. Is there anything said in this exhibit of the number of rails repaired or handled in August, 1868?

A. No, sir.

(Said exhibit is objected to by the defendant, for the reason that the witness has no knowledge of the matters concerning which he has testified.)

7. X Int. In Exhibit J you say that in October there were four fires running, and that 5,429 inches were welded, 789 rails repaired, and 11 cut. Do you know anything about this exhibit, of your own knowledge?

A. Not anything. It was reported and returned to me by Mr. Howe. I make the same answer with regard to Exhibit K.

(The three exhibits objected to by defendant, in the absence of the parties who performed the work, or were knowing to the performance of the work.)

Direct examination resumed:

4 Int. (By complainant.) Did you measure and take the account for the time it was kept for the month of August (Exhibit I) of the number of inches repaired during that time?

A. I did.

Cross-examination resumed:

8. X Int. Did you keep an account of the number of rails cut in August?

405 A. I did not; but, as I have already stated, my impression is there were fifty-six.

9 X Int. (By same.) What led you to keep this account in August?

A. Mr. Turrell requested me to do it.

10 X Int. (By same.) What did he say he wanted you to keep it for?

A. I understood him to say he had an anvil or a block for to be used in repairing rails, which he had patented, and he had commenced suits, or was going to commence a suit, against parties using it, and he wished to ascertain the difference between the old and new methods, or between the old and new blocks. This was the substance of the reason assigned by him.

GREENOUGH McQUESTION.

Sworn to on the 23d day of August, A. D. 1869, and subscribed by the same Greenough McQuestion on the said 23d day of August, A. D. 1869, before me.

WM. L. FOSTER,
U. S. Commissioner.

EXHIBIT I.

CONCORD, MANCHESTER & LAWRENCE RAILROAD,
Master Mechanic's Office, Concord, N. H., August, 1868.

The report of rail-shop of Concord Railroad for the month of August, 1868, is as follows:

We had two fires in blast, at which was performed:

17¾ days' labor of smiths at $2 00	$35 50
26¾ " " " helpers " 1 50	40 12
Cost of coal, 250 pounds per day	17 43
	$93 05

Welded 829 inches, at a cost, for labor and coal, of 11 22-100 cents per inch.

GREENOUGH McQUESTION.

406 EXHIBIT J.

CONCORD, MANCHESTER AND LAWRENCE RAILROAD,
Master Mechanic's Office, Concord, N. H., October, 1868.

The report of the rail-shop of Concord Railroad, at Manchester, for month of October, 1868, is as follows:

We had four fires in blast, at which 210 days' labor was performed, as follows:

84 days, at $2 00	$168 00
128 " " 1 50	189 00
Cost of coal 84 days, at 1 12½	94 50
	$451 50

Number of inches welded	5,429
Number rails repaired	789
Number rails cut	11
Average cost of labor and coal per inch	8 32-100 cts.
Average No. inches per rail	6 89-100 "

GREENOUGH McQUESTION.

EXHIBIT K.

CONCORD, MANCHESTER & LAWRENCE RAILROAD,
Master Mechanic's Office, Concord, N. H., January, 1869.

Report of rail-shop of Concord Railroad, for 25¼ days, from December 7, 1868. There were four fires in blast, at which was performed 253½ days' labor, as follows:

101 days of smiths, at $2.00	$202 00
152½ " " helpers, " 1.50	228 75
Cost of coal for 101 days, at $1.12½	113 63
	$544 38

Cost of coal $9.00 per ton.

407 Number of inches welded	9,227
Number of rails repaired	950
Cost of labor and coal per inch	5.89 cts.
Average inches welded, per rail	9.71
Average number inches welded, per fire, per day	92¼
Average number rails " " " "	9½
Average pounds coal each fire, per day	250

Used blast-blower, with capacity for ten fires, for open forge, and Cumberland coal.

GREENOUGH McQUESTION.

For the year commencing April, 1869.

In	the	month	of	April	was	repaired	808	rails,	511	lbs.	iron used.
"	"	"	"	May	"	"	710	"	505	"	" "
"	"	"	"	June	"	"	777	"	521	"	" "
"	"	"	"	July	"	"	849	"	608	"	" "

SAMUEL H. TURRILL ET AL.
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY. } And in other cases, as per stipulation.

ISAAC G. HOWE.

I, Isaac G. Howe, of Concord, in the county of Merrimac, and State of New Hampshire, depose, testify, and say as follows, in answer to the following interrogatories:

1. Int. (By complainant.) What is your occupation, and for how long have you followed it, and for what railroad company are you employed, and at what place?

A. I am a blacksmith. I have followed that occupation about twenty years. I am employed by the Concord Railroad Company, at Manchester, N. H.

2. Int. (By the same.) What position do you occupy at the shops in Manchester for the Concord Railroad?

408 A. Foreman of the rail-repair and rail shop.

3. int. (By same.) What kind of a block or anvil do you use in repairing rails?

A. I have two different kinds. One is a plain anvil, with a side swage on one side; the other is a plain anvil, with a groove on both sides.

4. Int. (By same.) Look at model marked "Common Anvil," with swage P, and is it a fair representation of the kind of anvil-block you use, and how many have you of them, and how many of the other kind with the groove on both sides of the anvil, at the shop that you have charge of?

A. It is a fair representation of two of the anvil-blocks that I use. I have two of the other kind at said shop.

5. Int. (By same.) State the process gone through in repairing rails at your shop, and the kind of rail you repair.

A. We load our rails outdoors onto a car and run them into the shop. We place the car betwixt the two fires as near as convenient, and the men from both sides take the rails off the car and swing them onto their run or slide, placing them in a proper position. They place one end into the fire to heat. When heat, they take it out onto the anvil and chip it off or scarf it, replace it into the fire again with a piece of iron to patch or weld on to the same, then, when heat, they draw the rail out of the fire, placing the rail onto the anvil, and then lay their iron on and weld it, or hammer it with hammers weighing about six pounds apiece. In many cases where we weld on a piece of eight to ten inches we have to replace it into the fire again to take another heat. In finishing it up we very often get too low, and have to draw it up with a fuller to get the rail back to its proper height. We smooth it up and square it up with a flatter, and replace it on the car.

6. Int. (By same.) Have you kept an account of the rails repaired last October and December and a part of January, and were the men steadily employed in repairing rails during the time said account purports to have keen kept?

409 A. I have kept such account. The men were steadily employed in repairing rails during said time.

7. Int. (By same.) To whom did you return that account?

A. To Mr. McQuestion, the time-keeper or clerk of the Concord Railroad shop.

8. Int. (By same.) Will you please examine Exhibits J and K, now shown you, annexed to the deposition of Greenough McQuestion, or have you examined them, and state, if not correct, wherein they differ from your account which you kept during the time in which they purport to have been kept?

A. I have examined them; I find them all correct, with one exception. I find on my account there are twenty-two rails cut that he hasn't got on Exhibit K.

9. Int. (By same.) During the time in which said account was kept, did your men do more or less work than since that time, per day?

A. I think they done about the same.

10. Int. (By same.) Are the wages paid the men, as represented in Exhibits J and K, correct; the amount of coal used per day at each fire, and the kind of fire stated to be used?

A. They are.

Cross-examination:

1. Int. (By S. M. Whipple, esq., counsel for defendants.) What number of inches of weld do you consider a fair average day's work for one fire, or the work of the blacksmith and two helpers per day of ten hours?

A. From eight to nine feet.

2. Int. (By same.) How much more than this average would they do some days?

A. They wouldn't go much over that no day. Some days they would fall short of it.

Int. 3. (By same.) What kind of chair do you use on your road?

410 A. We use a cast-iron chair on the old rail. On the new iron we use the chair with iron fish-plate on one side and a wooden splice on the other. In repairing a rail for fish-plate, we have to take a great deal of pains in chipping out to fit the plates; and consequently we can't do near as much work on the new iron as we can on the old.

Int. 4. (By same.) What proportion of the iron repaired, as set forth in Exhibits J and K, was new and what part old?

A. I should think in K perhaps one-quarter was new, and in Exhibit J one-third, as near as I could judge.

Int. 5. (By same.) What method is adopted by the company for keeping its account of rail-repairing—the same as set forth in these exhibits, or different?

A. The same as set forth here is the way I was requested to keep them by the master mechanic of the shop and the time-keeper, when I first took charge of the shop in August, 1868. I have kept the accounts ever since then in the manner set forth in these exhibits, with the exception of one thing—that is, I do not keep the number of inches of iron welded; but I keep the number of rails and the number of days' work, as near as can be.

Int. 6. (By same.) Do you know anything of the process of repairing rails by holding the neck of the rail in jaws made for that purpose; if so, what do you know about it?

A. I do. I worked on an anvil eight or ten months; a great share of that time in Alton, Illinois, for the Chicago, Alton & St. Louis Road. We used to average from twelve to fifteen rails per day—myself and two helpers—at one fire; the other fire had three helpers and a blacksmith.

Int. 7. (By same.) From your own experience in the use of the two blocks or anvils used for this purpose, what, in your judgment, is the difference in the amount of work done per day—all the circum-

411 stances being equal, save that one is a plain block with grooves, and the other is a block having jaws for holding the rail?

A. I should prefer the jaws for welding the fish-rail in preference to the plain anvil. I think the difference would be all of a quarter in favor of the jaws. I think they would be preferable to the plain anvil with regard to the old rail without the fish-plate. If rightly managed, I should say the difference would be, perhaps, an eighth in favor of the jaws. The quality is best as welded in the jaws, with regard to both kinds of rails. In fulling it up on the anvil it is very apt to split the throat of the rail, and also leaves a weak place where they lap the patch on to the rail on the common anvil.

Int. 8. (By same.) What would you consider a fair average day's work, in feet, for one fire where clamping-jaws are used to hold the rail with open fire, and all other things favorable?

A. I should judge that I'd weld from ten to twelve feet.

Direct examination resumed:

Int. 11. (By complainant.) Did you ever keep any account of the inches that you welded while you worked at Alton for the Chicago, Alton & St. Louis Railroad Company?

A. I did not.

Int. 12. (By same.) What kind of fire did you use, and how blown? What kind of coal or coke—good or bad—and how far did you have to

carry your rails to get them to the fire; and how far, after they were repaired, to get them out of the shop at the place for depositing them after taking them out of the shop?

A. We used a furnace blown with hand-bellows. Illinois coke, and very bad at that. Couldn't very often weld but one rail before we had to clean the fire out. Had to carry the rails about one hundred and fifty feet, by hand, to get them to the fire, and about one hundred feet to the place of depositing them after they were repaired.

412 Int. 13. (By same.) Was it or not very difficult to get a heat on the rail on account of the furnace being so large, and not having sufficient power of the bellows to blow the proper blast required for heating rails in that kind of furnace?

A. It was.

Int. 14. Did you have reference, in speaking of the fish-joint rail used on the Chicago, Alton & St. Louis road, in making your estimate as to the difference between the common anvil and the blocks with jaws, or the fish-rail, that you refer to on the Concord road?

A. I had reference to both.

Int. 15. (By same.) What is the difference between them?

A. In one the neck or throat is square; in the other it is nearer the shape of the old T rail. The one on the Chicago, Alton & St. Louis road is square.

Int. 16. (By same.) Give the height and length of the rails in both cases, and which is the heaviest?

A. The height of the rail on the Concord road is 3¼ inches; length, 24 feet. The other rail is most of it 4 inches high, and the length from 24 to 28 feet. The latter is the heaviest.

Int. 17. (By same.) Are the rails on the Concord road what is called heavy or light iron, and what is the length and height of the old T-rail?

A. They are about middling heft; not very heavy. The old T-rail is 18 feet long, and 3¼ to 3½ inches high.

Int. 18. (By same.) Could you take a fish-rail on the Chicago, Alton & St. Louis road, repair it on a common anvil, and make a practicable job of it as a business?

A. I could not.

Int. 19. (By same.) Did you ever repair any railroad-rails before you repaired those at Alton, and did you have conveniences there for making a proper estimate of what you could do with the experience you had at that time?

413 A. I never repaired any railroad-rails before I repaired those at Alton. I don't think I did have such conveniences. I worked there eight or ten months, but I didn't work on rails nearly all the time myself. I worked on rails about a third of the time. The rest of the time I was repairing road-tools, and making road-crossings and spring-frogs.

Int. 20. (By same.) Did you use the clamping-jaws for making frogs, and could you or could you not weld the steel on the frogs without the aid of the jaws for doing it?

A. I used them for chipping out the frogs. I could not very conveniently weld the steel on to the frogs without using the jaws for doing it.

I. G. HOWE.

Sworn to on the 23d day of August, A. D. 1869, and subscribed by the said Isaac G. Howe, as above, on the said 23d day of August, A. D. 1869, before me.

W. L. FOSTER,
U. S. Commissioner.

SAMUEL H. TURRILL ET AL.
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY. } And in other cases as per stipulation.

On the 20th day of August, A. D. 1869, at Keene, N. H., the deposition of James W. Greenwood was taken in said cases, on the part of the complainant, under the stipulation aforesaid; the parties appearing, etc., as follows:

Present: Complainant in person, and S. M. Whipple, esq., of counsel for defendant.

JAMES W. GREENWOOD.

Int. 1. What is your name, age, and occupation?

A. James W. Greenwood. My age is forty-nine, and my occupation, repairing cars; the same as it was when I gave a deposition,
414 April 21, 1865, in a case between Samuel H. Turrill and others, plaintiffs, and the Illinois Central Railroad Company, defendant.

Int. 2. Did you, during the time in which you patched rails, ever keep an accurate account of the amount of work done per day?

A. No, sir; I never did. I never weighed my coal nor measured my patches. When I gave my statement it was merely a guess at it. That was my opinion then, and it is still my opinion, that we mended from ten to twelve feet per day, as stated in that deposition.

Int. 3. Did you work at any time in the same shop with James Connor, repairing rails? If yea, can he do as much work at repairing rails as the ordinary run of men, and do you consider him a number one rail-patcher?

A. I did work for some time—two or three years—in the same shop with James Connor; he will do as much work and as well at any kind of blacksmithing as most common blacksmiths. I do consider him a No. 1 rail-patcher.

Int. 4. Would you take his statement which he might make as being true and correct as to any kind of work in blacksmithing or rail-patching?

(This interrogatory being objected to, is withdrawn.)

5. Int. Could he repair as many rails as any other blacksmiths who were repairing rails in said shop at the time you were at work there?

A. I pretend to say he could, sir. Each of us kept a book in which each day's work was set down. We used to compare said books, and we used to get out from seven to fourteen rails at each fire per day.

JAS. W. GREENWOOD.

415 SAMUEL H. TURRILL ET AL.
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY. } And in other cases as per stipulation.

On the 20th day of August, A. D. 1869, at Keene, N. H., the deposition of James Connor was taken in said cases on the part of the complainant, under the stipulation aforesaid, the parties appearing, etc., as follows:

Present: Cmplainant in person, and S. M. Whipple, esq., of counsel for the defendant.

JAMES CONNOR.

Int. 1. What is your name, age, and occupation?

A. James Connor. I am about fifty years of age, and a blacksmith by occupation.

Int. 2. Did you give a deposition, April 21, 1865, in a case in which Samuel H. Turrill and others were plaintiffs and the Illinois Central Railroad Company defendant?

A. I did.

Int. 3. Are you repairing rails, at the present time, for the Cheshire Railroad Company, and have you been steadily so employed, since giving your former deposition, by the same process as you were then, as stated in that deposition?

A. I am and have been so employed.

Int. 4. What is the exact size of the block which you use in repairing rails; and is model marked "Common anvil," with swage P inserted in the top, a fair representation of the block you use, as to size and thickness?

A. The exact size is twenty-four by twenty inches face and eighteen inches in depth. With the exception of size and thickness, the model referred to is a fair representation of the block used by me.

Int. 5. How many fires have you run in said shop, steadily, since giving said deposition; how are the fires blown, by blast or bel-
416 lows; and what is the number of men employed at each fire; and are you now and have you been foreman of said shop all the time since giving said deposition?

A. Most of the time we have run two fires upon rails; some of the time three. The fires are blown by blast. Three men, a blacksmith and two helpers, are employed at each fire. I am and have been foreman of the rail-shop all the time since giving said deposition.

Int. 6. What are the wages of the blacksmith and helpers, each?

A. The wages of the helpers, since last April, have been one dollar and sixty cents each per day. Prior to that they were one dollar and fifty cents each per day. Prior to last April my wages were two dollars and seventeen cents per day; since that time they have been two dollars and twenty-five cents. When my wages were two dollars and seventeen cents, one of the other blacksmiths had two dollars and eight cents per day.

Int. 7. In your former deposition, in April, 1865, you state a fair day's work of ten hours of solid weld is from ten to twelve feet; had you ever kept an account of how much welding you did per day by actual measurement, or was it an off-hand estimation?

A. Up to that time I had kept no account, by actual measurement, and the statement then made was merely an estimate; but I have since ascertained, by actual measurement, the amount of such work accomplished in a day.

Int. 8. How long did you keep such an account?

A. I kept it two months, September and October, 1868.

Int. 9. Are the accounts now produced and annexed to this deposition, marked "Exhibit D" and "Exhibit E," and subscribed with your name, true and correct as to the number of days, and rails and inches repaired each day, and were you steadily employed while keeping said accounts all the while in repairing rails?

A. I was engaged in repairing rails all the time during which
417 said accounts extend, and in no other work. The accounts are true and correct as to the number of days, and the rails and

inches repaired; but during a portion of this time we were engaged in loading and unloading and sorting rails. In loading and unloading rails we were assisted by yard-men and wood-men, and it takes from twenty minutes to half an hour in unloading fifty rails.

Int. 10. Is the statement at the bottom of each of said accounts a correct statement of the whole number of rails repaired at the three fires in said shop during said two months?

A. It is as correct an account as I could keep; there may have been a few rails more or less; it is substantially correct.

Int. 11. Did you do as much work during the time for which you kept the accounts in your statement as you have usually done since you have been repairing rails?

A. I worked the same as I usually do the year in and the year out. We calculated to work ten hours per day.

Int. 12. Where are the rails unloaded from the cars to be repaired, and how far from the fires, and how far do you carry them after they are repaired in removing them from the shop?

A. The rails are unloaded close to the side of the shop, and are slid into the shop at the time of unloading, and are then some four or five feet from the fires. We let them out from the shop on the run about twenty-one feet.

Int. 13. How much coal per day, upon the average, do you use at each fire?

A. About three hundred and fifty pounds. The master-mechanic, Mr. Perry, directed me to weigh it one day.

JAMES CONNOR.

418 EXHIBIT D.

KEENE, N. H., *September 30th*, 1868.

James Connor welded railroad rails for the Cheshire Railroad as follows:

1868.				
September	1....	8 rails welded.	80 inches of patching.	
"	2....	9 " "	86 "	rails cut.
"	3....	9 " "	100 " " " "	
"	4....	8 " "	94 " " " "	
"	5....	7 " "	97 " " " "	
"	6			
"	7....	9 " "	95 " " " "	
"	8....	8 " "	86 " " " "	
"	9....	9 " "	90 " " " "	
"	10....	8 " "	85 " " " "	
"	11....	9 " "	96 " " " "	
"	12....	8 " "	100 " " " "	
"	13			
"	14....	9 " "	91 " " " "	
"	15....	8 " "	82 " " " "	
"	16....	8 " "	81 " " " "	
"	17....	8 " "	86 " " " "	
"	18....	9 " "	91 " " " "	
"	19....	8 " "	89 " " " "	
"	20			
"	21....	9 " "	90 " " " "	

"	22....	8	"	"	96	"	"	"	"
"	23....	9	"	"	100	"	"	"	"
"	24....	9	"	"	98	"	"	"	"
"	25....	8	"	"	97	"	"	"	"
"	26....	9	"	"	86	"	"	"	"
"	27....								
"	28....	9	"	"	84	"	"	"	"
"	29....	7	"	"	76	"	"	"	"
"	30....	All hands off.							

No. of pounds of coal at one fire, three hundred and fifty; three
419 fires in the shop; all fires supposed to use the same quantity of coal; three and one-quarter pounds of iron to each foot of patching; patch-iron, four dollars and fifty cents ($4.50) per hundred; coal, ten dollars ($10) per ton. Total number of rails fixed at the three fires, 610, in the month of September.

WAGES OF FOREMEN AND HELPERS.

$2.17
2.08
2.00 } per day.

2 helpers at each fire.
Wages of helper, $1.50 per day.
" " 1.50 "
" " 1.50 "

JAMES CONNOR.

EXHIBIT E.

KEENE, N. H., *October 30th*, 1868.

James Connor welded railroad-rails for the Cheshire Railroad as follows:

1868.				
October	1....	8 rails welded.	92 inches of patching.	
"	2....	On other work.		
"	3....	" " "		
"	4			
"	5....	8 rails welded.	91 inches of patching.	
"	6½...	5 " "	50 " " "	
"	7....	On other work.		
"	8....	" " "		
"	9....	" " "		
"	10....	" " "		
"	11			
"	12....	9 rails welded.	99 inches of patching.	
"	13....	On other work.		
"	14....	9 rails welded.	102 " " "	
"	15....	7 " "	95 " " "	
"	16....	8 " "	109 " " "	
"	17....	7 " "	95 " " "	
"	18			
"	19....	8 railed welded.	98 " " "	
"	20½...	4 " "	50 " " "	
"	21....	On other work.		
420 Oct.	22½...	5 rails welded.	50 inches of patching.	
"	23....	8 " "	98 " " "	
"	24....	On other work.		

"	25						
"	26....	8 rails welded.		95	"	"	"
"	27....	On other work.					
"	28....	8 rails welded.		100	"	"	"
"	29½...	4 "	"	52	"	"	"
"	30....	2 "	"	20 in pa'g; 10 rails cut			
"	31½...			8 " "			

Total amount of rails welded at all the fires during the month of October is 425 in this shop. There are three fires in the shop. Amount of coal used per day at each fire is 350 pounds; 3½ pounds of patch-iron to a foot. Coal at the rate of ten dollars ($10) per ton; patch-iron, four dollars and fifty cents ($4.50) per hundred; wages as before.

JAMES CONNOR.

421 DEPOSITIONS OF PARTIES USING THE CAWOOD PATENT OR IMPROVEMENT ON THE COMMON SWAGE-BLOCK, SOME OF THE PARTIES HAVING USED BOTH METHODS.

The depositions of M. Pearson, B. Christner, P. Christner, Peter A. Craig, Charles C. Dodge, F. Marker, R. St. Clair, J. W. Smith, James Monk, John McCormick, Daniel Rooney, J. Clemous, taken before P. A. Hoyne, commissioner, July 3d, 1869, on behalf of complainant.

SAMUEL H. TURRILL
v.
THE ILLINOIS CENTRAL RAILROAD COMPANY. } And in other cases, as per stipulation.

Complainant appearing in person, and J. N. Jewett, of counsel for defendants.

M. PEARSON.

1. Int. What is your name, age, residence, and occupation?

A. My name is Meredith Pearson. My age is 36 years. I reside in La Salle, Illinois. My occupation is blacksmith.

2. Int. In whose employ are you, and how long have you been so employed, and in what special branch?

A. The Illinois Central Railroad Company. I have been so employed since about September, 1854. No work made a specialty. I have worked at all kinds of work which was needed by the company—all work appertaining to blacksmith-work, as required by their use.

3. Int. Have you worked at repairing railroad rails, and for
422 how long, and upon what machine, and for what company, and from about what time; and are you foreman of the blacksmith and T-rail shop?

A. I have been repairing iron from about 1858 or 1859; I am not certain which. Except the last three years I have done little or none of it. The name or title of the machine I do not know. It is like the model marked "Exhibit Ill. Cent. R. R. Co. machine," for the Illinois Central Railroad Company. I am now foreman of the blacksmith-shop, and have been during the whole of the time I have mentioned.

4. Int. How many feet or inches of railroad repairing or patching have you put on in one day, and what was usually the amount put on daily during the time which you repaired railroad rails?

A. I have put on four hundred and fifty inches, but I find on investigation that it was no criterion, as this was on test-work. The amount put on daily would vary, as we are limited in the number of inches to be put on. First we were ordered to put on sixty inches and no more; then forty inches and no more; and so on down to twelve inches and no more, on one rail. It would amount from 175 to 225 inches, except the last year, which would not average over 160 inches.

5. Int. What did you average when you repaired rails when you put on 450 inches in a day?

A. I cannot tell what the average would be. I think I averaged over 300 inches a day.

6. Int. At what price did you once offer to take a contract to do the work—the labor alone?

(Objected to by counsel for defendants.)

A. I think it was 2 or 2½ cents. I am not certain. I think 2½ cents an inch.

7. Int. How much did it cost the railroad per inch at the time you offered to take the contract for the labor alone?

A. I do not think I can answer this. I figured it and they figured
423 it, but I cannot now call to mind what the figuring was. I think at one time it cost less than two cents per inch for the labor.

8. Int. How much over 300 inches have you put on per day for an ordinary day's work?

A. That I cannot tell. I have put on 450 inches in a day as test-work, and 425 inches as test-work in nine hours.

9. Int. What did you ordinarily put on daily about that time?

A. I suppose the average, when I worked at it myself, would be over 300 inches per day.

10. Int. How many men were employed at each fire, and what kind of fire or machine was used, and what was the wages of each per day?

A. There were three men at each fire; that is, the smith and two helpers. At the present time we pay $2.50 per day for smiths, and $1.75 per day each for the helpers at the rail-fire.

11. Int. How much coal was used per day at the rail-fire, and is the man who is foreman of that fire a practical smith, and could he repair railroad rails without the use of said machine?

A. Coal would vary; they would burn from 200 to 350 pounds per day. I cannot call the man at that fire a practical workman. It would be difficult to repair rails without a machine of some kind to hold the rail. I do not think he could repair them without the use of some machine to hold the rail.

12. Int. Do you not make and repair his tools used in the mending of railroad iron, and for other shops along the line of the road, because the men working on the repairing of the iron on the road do not know enough to make and repair their own tools?

A. Yes, sir; I make and repair his tools. I have made the greater portion of the tools for the other shops on the northern division. The branch and southern divisions we have nothing to do with. The men employed in the other shops, I cannot testify as to whether they
424 are first, second, or third class workmen, nor for what reason the making of the tools was assigned to me.

13. Int. How many rails will a man engaged in repairing rails repair per day, and the number of inches put on daily, and the kind of iron; whether the old-fashioned T-rail or the fish-joint rail, representing about the letter H?

A. That I am unable to say. Twenty-two heats would be the maxi-

mum number of heats; and sometimes a rail may have to go into the heat from one to three times before it was repaired. The rails would run from seven to fourteen rails repaired, and would run from four to ten cut. The number of inches put on daily would vary from 175 to 225 per day, and the last year would be lower than this. Our rails which we have repaired have been the old-fashioned rail. We have repaired very little of the fish-rail, or the high rail, as we call it.

14. Int. Do you repair them all on the same machine?

A. No, sir.

15. Int. Do you have to have a machine for each kind of rail?

A. We have a machine for each rail; one for the old rail and one for the high rail, as we call it.

16. Int. Is not the high rail called fish-joint rail?

A. I do not know whether manufacturers give it that title or not. We term it the high rail at our place.

17. Int. Is it not perforated with holes at each end of the rail, and a strip of iron put on each end of the rail, and bolted through?

A. Yes, sir. Each rail is perforated with two holes in each end, and two straps, one for each side of the rail, and four bolts.

18. Int. Is it not more difficult to mend this rail than the old-fashioned T-rail?

A. I do not know but it is, as the block will not hold it. It would repair just as easily if the block would hold it as well.

425 19. Int. If the block were properly constructed, would it not hold it as well?

A. I do not know. That rail is a different form, and if the block was differently constructed, I do not know what effect it would have.

20. Int. Do you make frogs; and how much steel do you put on to each frog; and could it be properly put on without the aid of such machine?

A. We do make them, and we put on about six to eleven feet, more or less; the steel could be put on without the machine. I have put it on, but with the aid of the machine to hold the rail I can put more on in a day, and perhaps better. There are other machines which could be used to put on the steel, by which we could do as much and perhaps more than without the machine.

21. Int. What other machines do you mean than the one like the model before you?

A. There is a machine called the Beebe machine.

22. Int. Does that machine not hold the rail precisely in the same manner, when the jaws are closed, and accomplish the same result?

A. That machine holds the rail in the same position, but I have thought the result better.

23. Int. Why?

A. Because they did not expand or fly apart when the rail was struck, but would rather tend to press together and hold it closer.

24. Int. Have you ever repaired railroad iron on a common anvil or a swage-block?

A. I think I have repaired some six to a dozen rails on a common blacksmith's anvil. This was before we had a machine. I have never used the swage-block.

25. Q. Do you scarf the rails before you put on the patching?

A. As a general thing, we do.

426 26. Q. Do you keep an account, and make a report of the rails repaired, and to whom and how often, and for how long a time?

A. Yes, sir. I make the report to the supervisor, weekly. Formerly we reported to headquarters, direct to the division engineer.

27. Int. When you first commenced repairing rails did you report to the division engineer, in 1858 or 1859?

A. We reported for a number of years to the division engineer; then we were ordered to report to the supervisor. This was when we first commenced repairing rails.

20. Int. What is the name of the engineer and the supervisor to whom you reported?

A. I think John Newell was the first division engineer to whom we reported; second, S. T. Emerson; and M. A. Stafford was the supervisor to whom we were ordered to report. We still report to him.

29. Int. Where does M. A. Stafford reside?

A. At La Salle.

Cross-examination:

1. X Int. Are you certain as to the time when rail-mending was commenced in the shops at La Salle?

A. No, sir.

2. X Int. Do you know, and, if so, state the reason why, the number of inches you were allowed to mend upon a rail was changed from time to time.

A. I do not know positively. I had my own opinion, but I do not know why it was done.

3. X Int. Would it, in your judgment, be economy in the arrangement of a railroad to mend as much as five feet upon a single bar?

(Objected to.)

A. I think not.

427 4. X Int. What would be the difference in the amount of mending you could do, mending five feet upon a rail, and the amount you could do mending only twelve inches on a rail?

A. It would make considerable difference. I should think near on one hundred inches per day, taking the number of inches, or very near a third.

5. X Int. How many inches were you allowed upon a rail at the time you put on 425 inches at a time and 450 inches at another in one day?

A. I think it was 40 inches at this time, as it was test-work.

6. X Int. Under what circumstances was this experiment or test made?

A. That test was made on a bet that the La Salle shop could not put on 400 inches in a day. The proposed bet was one hundred dollars, but the money was never put up.

7. X Int. Could you or any other man work consecutively at this rate?

A. I am well aware that I could not. I cannot tell how much any other man could do.

8. X Int. What is the amount of mending that can profitably be done on the single rail in your judgment?

(Objected to.)

A. If a rail is good it may be profitable to put on 24 inches, but I have always considered that more than this was unnecessary and a detriment to the company.

9. X Int. Is it not easier to put on 24 inches of weld at the same place on the rail than to put on 12 inches each in two places?

A. Yes, sir.

10. X Int. When you speak of being allowed to put on 12 inches only upon the rail, do you mean 12 inches in a single patching or 12 inches as a whole on the rail?

A. I understood the orders to be that the average should be
428 about 12 inches to a rail; some rails might take 16 inches and some less than 12 inches, but the average was to be 12 inches on a rail.

11. X Int. Was it not your idea, from your instructions, that if a rail required more than about 12 inches of mending it would be unprofitable to repair it?

A. That is what I inferred from the orders I received. I have repaired rails which have taken 16 inches, which I have thought unprofitable to the company.

12. X Int. Do you know the whole expense to the company per foot or inch at the La Salle shop for repairing?

A. No, sir.

13. X Int. With the ordinary workmen employed in that business in the La Salle shop, what has been the average amount of mending done daily?

A. I do not know.

14. X Int. State according to the best of your recollection.

A. The man that I have on the fire now would average probably 10 repaired and 4 or 5 cut.

15. X Int. And what would be the amount done on an average upon each rail?

A. I have thought the general average would be about 16 inches or more. I have had no means of knowing what the average was.

16. X Int. Is that man an ordinary good workman at the business?

A. I might state it ordinary, but not good.

Direct examination resumed:

1. Int. How many rails did you repair on the day when you put on 450 inches; and did you put on 40 inches to each rail, and what was the average number of rails repaired daily at that time?

A. I am not able to state how many rails I did repair or how
429 many inches put on; they were selected rails. I do not think I put on 40 inches to each rail for the reason that the block was only 18 inches, and in taking the heats it would make only 36 inches. When I was repairing the average was pretty large, as a good many of the rails did not need repairing at both ends. I do not think it was less than from 6 to 23—average about 16.

2. Int. How long a weld did you ever put on at one heat?

A. I have put on 18 inches solid, and I think, perhaps, in some cases more.

MEREDITH PEARSON.

DANIEL ROONEY.

Daniel Rooney, the next witness introduced, cautioned and sworn, deposeth and saith:

1. Int. What is your name, age, residence, and occupation?

A. My name is Daniel Rooney. My age is forty years; reside at Summit. I am a blacksmith.

2. Int. For whom are you employed, and how long have you been so employed, and for what special business?

A. The Chicago & St. Louis Railroad Company. I have been so employed nearly nine years, making frogs and crossings and general work. I repaired rails about three weeks. I am foreman of the shop at Summit. I have been foreman about six years.

3. Int. Do they repair railroad-rails at that shop, and how many machines do they use, and what kind of machines; if so, how long have they repaired rails there?

A. They do repair railroad-rails there. They use two machines; they use one machine like the model shown, called the Whitcomb machine, and marked "Whitcomb machine," and the other like the other model shown, marked "J. D. Cawood patent, September 9, 1856," on a silver plate, with a crank to open and close the jaw with cam attachments. They have repaired rails there about eight years.

430 4. Int. State the process of preparing a rail to be patched, and the process of patching the same, and the different operations?

A. We bring the rail in and hang it on the crane, to suspend it so that one end of the rail will reach the fire until a welding-heat is obtained; then the rail is placed between the jaws of the machine, which are closed so as to hold the rail in an upright position. A piece of iron of the proper thickness is, in the mean time, heated to a welding-heat and placed upon the top of the rail in the jaws, and welded to it with hammers and sledges; then the top of it is swaged with a tool to make it correspond with the rail in height and shape, driving the surplus iron out at the sides of the rail, forming fins on the side of the rail, which we trim off with a chisel while in a heated state; then the rail is taken out of the jaws and placed in the side-swages and smoothed up with a side-swage; it is then placed back in the jaws again, and square the end up and smooth it off with a top-swage and flatter.

5. Int. How long have those machines been in use in that shop?

A. The first machine that was used was like the model marked "Ills. C. R. R. Co.," but this was discarded after about two years; then the Whitcomb machine was used, and which has been in use ever since. We also used the Cawood machine, like the model before me; this has been used, I think, about four years, and is in use now in the shop.

6. Int. Do you have different machines for different height of rails; and, if so, why do you have them?

A. We do have different machines; we have to have a machine to repair the fish-bar rail, as it is higher in the neck; we now only use the two machines.

7. Int. Do you keep the report of the work done at that shop?

A. I draw off the time and amount of work done and give it to the road-master.

431 8. Int. What kind of fire do you use?

A. A bellows-fire; we use a common blacksmith's bellows.

9. Int. How many hands to each fire?

A. Three; one smith and two helpers.

10. Int. What wages per day do they get?

A. The foreman gets $3.00 per day, and $1.75 per day for the helpers each.

11. Int. How many rails per day do they average at each fire repairing?

A. Sometimes from nine to eighteen rails.

12. Int. What is the average per rail that they put on?

A. About eight inches at each end; we do not put on more than two feet on any one rail.

13. Int. How much have you put on a rail?

A. If we are hard up for rail we have put on as much as three feet on a rail.

14. Int. What did it formerly average to the rail?

A. It would average about twelve inches at each end.

15. Int. How many feet or inches did you formerly put on as an average day's work at each fire?

A. From 180 to 250 inches; when we worked steady at repairing rails it would be about 250 inches.

16. Int. Is it more difficult to repair the fish-joint rail than the old-fashioned T-rail?

A. Yes, it is.

17. Int. How much coal do you use per day at each fire?

A. I should think from 130 to 200 pounds.

18. Int. What thickness and width of iron do you use?

A. Two inches wide and from one-half to one inch thick.

19. Int. How much steel do you put on the rails in making a frog?

A. We make them now all of steel; we formerly used eight inches on the joint and two feet on each wing.

432 20. Int. Could the fish-joint rail be repaired on a common anvil? (Objected to.)

A. I think not.

21. Int. Why not?

(Objected to.)

A. Because it would crush down; the neck is too long.

22. Int. Is there any difference between the Illinois Central machine, the Whitcomb machine, or the Cawood machine in holding or supporting the rail while being repaired?

(Objected to.)

A. They are all the same in the jaws.

Cross-examination resumed by mutual consent at some future time.

DANIEL ROONEY.

BALSAR CHRISTNER.

Balsar Christner, the next witness, of lawful age, introduced, cautioned, and sworn, deposeth and saith:

1. Int. What is your name, age, residence, and occupation, and for how long have you been so employed?

A. My name is Balsar Christner; my age, forty years and upwards. I am a blacksmith. I am at work at Niles, Michigan, for the Michigan Central Railroad. I am foreman of the blacksmith and T-rail shop of the work of that road on the west division. I reside at Niles, Michigan.

2. Int. How long have you worked at the blacksmith business, and at what place or places, and are you a practical blacksmith, and did you learn the trade?

A. I commenced at it in 1848 and have worked at it ever since. I commenced at Lancaster, New York State; then at Wayne, Michigan, for the Michigan Central Railroad; then at Chelsea, Michigan,
433 for the Michigan Central Railroad; then at Ann Arbor, for the same company; next at California, at Daley's Ranch, blacksmithing in general; then at Suisun City, in California; then at Watsonville, California; then at Barry Valley, California; then to Chelsea, Michigan; then from Chelsea to Niles, Michigan, in the employ of the Michigan Central Railroad; then to Lake Station, Indiana, and returned to Niles again, where I am still at work. I learned the trade.

3. Int. Have you mended railroad-rails; if so, when and where, and how long, and for what company?

A. I have mended them at Wayne, Michigan, at Chelsea, then at Ann Arbor, in Michigan, Niles, and Lake Station, for the Central Railroad Company.

4. Int. Describe the process for preparing and mending a railroad-bar in your own way.

A. First, we take the rail, put it in a crane, and swing one end of the rail into a blacksmith's forge, the bottom end upwards, and let it get to a red heat; then take it out and put it in the jaws of a machine, then take a fuller and upset the top of the rail, (like model, Exhibit P. A. Hoyne, commissioner, which represents a T-rail in process of repairing,) as far back as it is needed to be mended, then trim off all the loose splinters, then put back in the fire, and heat the rail to a welding heat on the end or center where the patch is required; and at the same time heating a piece of iron of the same width of the top of the rail, about from one-half inch to seven-eighths inches thick, according to the fracture; when a welding heat is obtained on both, then it is taken out of the fire and placed in the jaws of the machine, top upwards, and the machine closed to hold the rail; then the piece of iron is put on top of the rail and welded to it with hammers and sledges; then a top swage is put on top of the bar and swaged down to conform to the balance of the tread of the rail; the surplus iron working off each side as shown by the piece of rail numbered 15467, now before me; then it is taken out of the jaws of the machine, and set upon the face-plate of the
434 machine and the sides trimmed off the tread of the rail; then it is placed in the side-swages of the machine, and the sides are smoothed off with a side-swage, (before it is taken out, I would say that the piece of patch-iron is cut off with the rail,) then it is placed again in the jaws of the machine, and the end and top smoothed off with a flatter and top-swage; this finishes the end patch, like model marked number 15470.

5. Int. How long and with what kind of a machine have you worked or mended rails with?

A. I have worked two years with a Cawood machine, like the model, constructed like the one marked "J. D. Cawood, patent, September 9, 1856," now before me; about five years with a machine like model marked "Beebe & Smith, patent, June 9, 1857," now before me. I have also worked with a machine that operated with a cam at one end of the lever, and a ball at the other end of the lever to hold the bar in the jaws. I think it was called the Roberson machine; it was got up by some man who was foreman of the shop at Niles; but the principle was the same as the other. We worked on this machine about nine months.

6. Int. How many feet or inches is a fair average day's work on the Cawood or the Beebe & Smith machine, mending rails?

A. From twenty to twenty-five feet per day, on a general average of the rails. We can do about twenty feet of the three-inch rail, and twenty-five feet of the two and one-fourth inch rail per day.

7. Int. How many feet or inches did you ever put on in a day?

A. The largest day's work I ever done was three hundred and ninety-seven inches.

8. Int. What kind of rail is in general use on the Michigan Central Railroad, and what has been in use for the past seven or eight years?

A. The three-inch top rail. There is also a two and a half inch, two and a fourth inch; and about eight or nine years ago, they used a
435 two and a quarter rail, with a chair and chair-plank common T-rail; after this, a wide rail three inches on the tread, with a chair T-rail; then they used the same rail, applying the fish-joint; they now use two and a quarter fish-rail, four inches high, as fast as it is wanted to repair the road, as shown by the model marked "Exhibit 2."

9. Int. What kind of fire and how many hands to each forge and the wages of the men per day?

A. Common blacksmith-bellows; fire with coal; four hands at each forge; the wages—foreman, eighteen shillings to $3.00 per day; helpers, $1.50 each.

10. Int. What kind of coal is used and what is the cost of the same and how much used per day at each fire?

A. We use the Blossburgh coal. The cost is from $8 to $10 per ton. We use from 250 to 300 pounds per day.

11. Int. Do you keep an account of the cost of repairing rails at your shop for the Michigan Central Railroad? If so, what is the cost per foot?

A. I do *deep* an account. The cost is from forty-five to fifty cents per foot.

12. Int. In using a bellows-fire the extra man is employed at the bellows, is he not?

A We change around. There is no man to blow the bellows entirely.

13. Int. How much is the most you ever put on at a solid welding?

A. Twenty-two inches.

14. Int. Do you have to have different sizes of jaws? If you do, why so?

A. We do; because there is a difference in the size and shape of rail. On a rail, if we do not have the jaws to fit the rail, it will either split in the neck of the rail or settle down and get it out of shape.

15. Int. In repairing the fish-rail does it not require the rail to be kept at its proper height in order to use the fish-plate on the sides which form the fish-joint of the rail?

436 A. It does; because if not kept in its place you cannot get the fish on.

16. Int Does it require the rail to be supported under the tread and flange to make it a practical machine for repairing railroad-rails?

A. It does; because if you do not have a support at the bottom it will split the rail in the neck.

17. Int. If you put a four-and-a-half-inch rail into a machine for a four-inch rail to repair it, what will be the effect?

A. It will settle down so in the neck that you cannot get your fish-plates in.

18. Int. In your opinion as a practical blacksmith can the fish-rail be repaired without a machine to hold the rail and support the rail to keep it at its proper height? If not, why?

A. It cannot; because if you do not have something to support the top of the rail it will settle down, so that it will be impossible to get the fish into it to form the splice.

19. Int. Do you have men in your employ and under your charge who are not blacksmiths that repair rails successfully by the use of the Cawood and Smith & Beebe machine who could not without the aid of the machines repair rails?

A. I have.

20. Int. How much in feet and inches do they manage to repair in a day?

A. From 220 to 260 inches, on the average, of the wide top rail.

21. Int. Do you make frogs and face them with steel?

A. I do.

22. Int. How much facing on the frog do you steel?

A. From 2½ feet to 3 feet on each guard-rail, or about 7 feet to a frog.

23. Int. How much longer will a frog faced with steel last than the one which is not steeled?

437 A. One with steel will last as long as two which are not steeled.

24. Int. Could you face them with steel without the aid of a machine, and have it done practically?

A. I could not.

25. Int. What is the cost of making a T-rail frog, labor, material, etc.?

A. That depends on the length, as some are 18 feet, some are 21 feet. They cost from $60 to $70 each. The labor on a steel frog is worth about $12; on an iron one, about $7.

26. Int. After the steel has become worn out that is put on to face the frog, do you throw away the balance, or what do you do with it?

A. Sometimes we face them over again, if it is not too much worn out, and sometimes we throw it into the iron to have it melted over and rolled with the T-rail.

27. Int. How much does a T-rail frog weigh?

A. From 1,000 to 1,100 pounds, complete.

28. Int. Is there any difference between the Cawood, Beebe & Smith, and the Illinois Central machine in holding and supporting the railroad rail while being repaired?

(Objected to.)

A. They all accomplish the same result; although they are a different machine, the principle is the same.

29. Int. what block do you prefer to work, the Cawood or the Beebe & Smith; and is there any difference in the quality of work to be done on each?

A. The Beebe & Smith works a little the handiest; you can do as much work on one as the other; when you can get your hands broke in to the use of them.

30. Int. Do they not each support and hold the rail in the same position while being repaired?

A. They do.

438 31. Int. About what is and what has been the average amount of repairing per rail on the Michigan Central Railroad?

A. About 18 inches now. They used to put on from 3 to 4 feet on an average.

32. Int. The number of rails you averaged to each fire per day?

A. From 8 to 22 rails.

Cross-examination:

1. X Int. Do you ever cut off rails?

A. We do.

2. X Int. Do you include them in the estimate of a day's work as you have given?

A. I do.

3. X Int. How much for cutting?

A. Six inches for cutting off an end.

4. X Int. Do you have occasion simply to upset the rail without putting on the patch?

A. We have, very frequently.

5. X Int. How much is allowed for that in your estimate for a day's work?

A. Six inches per end.

6. X Int. Can you accomplish more or less for mending per day when you put on 3 feet per rail or 18 inches per rail?

A. We can accomplish more at three feet per rail; more inches.

7. X Int. How much more?

A. About 50 inches per day.

8. X Int. Was the 397 inches which you put on in one day an extra day's work?

A. It was. I mended a 21-foot rail from end to end in half a day, or five hours.

9. X Int. Did you ever mend rails on a common swage-block?

439 A. I did not.

10. X Int. Did you ever try to make a frog without the use of jaws to hold it?

A. I have and made them, but I did not put any steel on them.

11. X Int. Did you ever try to put the steel on without the jaws?

A. I did not. I never had any occasion to.

12. X Int. How much iron, in weight, do you use in patching rails per foot?

A. That depends on the size of the rail. On the wide rail from four to five pounds per foot; on the narrow, about one-fourth less; say from three to four pounds.

13. X Int. How many heats can you make at one furnace in an average day's work?

A. On an average, from twenty-five to fifty.

14. X Int. Why do you give so wide a latitude?

A. The difference is in welding and cutting heats.

15. X Int. How many rails which are simply cut off or upset at the end without patching do you average per day?

A. I should think from five to seven rails per day.

16. X Int. Did you ever mend rails in a block where the bottom of the rail was not supported?

A. I have not where the rail was not supported.

17. X Int. Supposing the jaws to fit properly the under surface of the upper table of the rail, could it not be properly mended without resting on the bottom, in your opinion?

A. No; not and keep the rail in good shape.

18. X Int. What would prevent?

A. It would settle down through the jaws and get out of shape.

19. X Int. Do you mean that it would lengthen the neck of the rail?

A. It would be apt to split the neck of the rail.

440 20. X Int. How do you know, if you have never tried it?

A. Common sense would teach this to any practical man.

Redirect examination:

1. Int. Is it not as much work to cut off and square up a rail as you do it, as it is to put on a patch on six inches?

A. It is not.

2. Int. Which will take the longest time, and how much the longest?

A. Putting on the patch will take about five minutes; the longest in getting it up to a welding heat; the work is no more on one than on the other.

Recross-examination:

1 X Int. What is the effect upon the temperature of the heated rail in bringing it in contact with the jaws of the machine?

A. There is not much; it makes it a little harder and makes it better to wear.

2. Int. Is not some time consumed in putting the rail between the jaws?

A. The time is hardly worth mentioning.

BALSAR CHRISTNER.

PHILIP CHRISTNER.

Philip Christner, the next witness of lawful age, introduced, cautioned and sworn, says that he has heard the testimony of the said Balser Christner, and that the should make same answers to the same questions; that he resides in Lake Station, Indiana, and is employed by the Michigan Central Railroad Company, and his evidence is taken in this short form by consent of the counsel of both parties.

PHILIP CHRISTNER.

441 PETER A. CRAIG.

PETER A. CRAIG, the next witness introduced, cautioned and sworn deposeth and saith:

1. Int. What is your name, age, residence, and occupation, and for how long and for whom have you been so employed?

A. My name is Peter A. Craig; my age, 28 years. I reside at Windsor, Ontario, or Canada West. I am a blacksmith; 'as a blacksmith fourteen years last April. For the first five years I was engaged as a general blacksmith. Since then I have been employed on rail-repairing for the Grand Trunk and Great Western Railroads, at different points on both roads. I have been stationed at Windsor five years next month, at railroad-rail repairing.

2. Int. State the process of repairing the rail in your own way.

A. A rail, like the piece of the one now before me, numbeaed 15474, is first put into a crane, and then swing the end into the fire the length that I wish heated. The rail is placed in the fire top-side of the rail down. At the same time a piece of iron of the required size is placed in the same fire, and both heated to a welding-heat. When heated the rail is taken out, turned over, and placed in the jaws of the swage-block. At the same time the heater brings the piece of iron which has been heated and lays it on top of the rail, and it is welded down with hammers and three sledges of fourteen pounds each, making it to resemble "Exhibit 1, P. A. Hoyne, commissioner." Then the top swage is placed on the rail, and with the aid of the swage it is swaged down to correspond with the height of the rail, as shown by iron-model 15467. It is then taken out of the jaws and placed on the anvil of the swage-block, and chip off the fins with chisels. It is then turned on the side in the side-swage, and place a side-swage on it to smooth up the sides of the rail to make it correspond with the balance of the rail. I ought to have mentioned that before the rail is taken out of the jaws of
442 the swage-block the end of the patch is cut off square with the end of the rail. It is then placed back in the jaws again and swaged down until it is level with the rest of the rail. Then it is taken out of the jaws; and if it is straight and does not need any side swaging it is finished.

3. Int. How much is now and has been your average day's work each day for the last four or five years in feet or inches per day?

A. For the last four years it has been twenty-two feet; before that, twenty-four feet per day. The road requires us to do that amount each day for a day's work.

4. Int. How much is the most you have ever put on in one day—solid welding?

A. Forty feet nine inches in about nine and a half hours.

5. Int. How much have you averaged to do in a month, solid welding, each day, and how many hours were you employed each day, and where and when?

A. I have averaged thirty-three and nine-twelfths feet per day for a month, with nine and a half hours of time each day. This was done at Windsor for the Great Western Railway. This was in the month of February, 1865.

6. Int. What kind of rail?

A. The T fish-rail, like model 15474.

7. Int. What kind of fire was used, and how many men were employed at each fire, and what was the wages per day paid for the same?

A. It is what I call a stock-back fire, being a hearth six feet by four feet, with a bellows used for blowing, such as is ordinarily used for mending T-rails. Myself and three helpers were employed; myself $2.25 per day; the heater $1.12½ cents; the other two $1.00 each per day.

8. Int. How much coal do you use per day for each fire, and what is the cost of the same per ton?

A. We average about 300 pounds per day, and the cost is from $5.00 to $5.50 per ton.

443 9. Int. What is the average quantity of iron used per foot to repair rails for the Great Western Railroad?

A. From four to four and a half pounds per foot.

10. Int. What kind of a machine do you use for repairing rails on the Great Western Railroad, and how many are in use on the road?

A. It is a machine like the model now before me, marked "Beebe & Smith, patent, June 9, 1857." I think there are seven in use on the road at the present time.

11. Int. How many rails do you average to repair, per day, and what has been the average amount of repairing on each rail during the time you have been repairing rails for the Great Western Railroad Company, at Windsor?

A. We average from 12 to 16 rails; the average is about one and ten-twelfths feet per rail. My orders are not to average more than two and six-twelfths feet per rail.

12. Int. Do you have to have different-sized jaws to repair different-sized rails; if you do, why so?

A. We do. We have two different-sized rails; one rail being 3¾ inches in height, the other 4⅛ inches in height. The 3¾ rail is lower in the neck, consequently it would not go into the jaws of the 4⅛ without leaving a space underneath the rail, and not supporting it on the flange to keep it from splitting the top off from the flange; and a 4⅛ rail could not be repaired in a 3¾ machine, as it would be so high the crown would be mashed down so that the fish-plates would not fit the rail.

13. Int. Does not the rail, suspended by the crane, have to be kept parallel with the jaws of the machine?

A. Yes, sir; perfectly parallel; if it is too low, the end of the rail would be bent down, and if the crane is too high it would bend the rail up and be apt to split it in the neck. Whenever I alter my jaws I have to alter the chain to make them parallel.

14. Int. What does it cost the Great Western Rail'oad to repair their rails, per foot, at Windsor, Canada?

A. About 40 cents per foot.

444 15. Int. Has the Great Western Road any rolling-mills to re-roll their old iron; if so, how long has the same been in operation?

(Objected to.)

A. They have rolling-mills of their own, at Hamilton; they have been in operation since June, 1864.

16. Int. Have you ever mended railroad-rails on a common swage-block or anvil; if so, when, and at what place?

A. I have; at Toronto, on the Grand Trunk, also at Richmond, and at Chaudier; this was in 1862.

17. Int. What was a fair average day's work in feet or inches on the common anvil or swage-block?

A. About eight feet per day.

18. Int. How much coal was used per day; what kind of a fire; and how many hands were employed at each fire?

A. We averaged about five hundred pounds per day at each fire, with a bellows fire; the same help was employed as at present, three hands beside myself.

19. Int. State whether there is any difference in the amount of iron used per foot, and if so, which method requires the most, and how much more, and why.

A. There is quite a difference in the quantity of iron used in the two methods. The old method of mending on a common swage-block requires about an eighth of an inch thicker iron, and from one-eighth to one-fourth wider, to accomplish the repairing of the rail, as there are no jaws to hold or support the crown of the rail, to keep it at its proper height.

20. Int. What kind of a rail was it you repaired on the common anvil?

A. It was the common T-rail.

21. Int. Can you repair the fish-plate rail on a common anvil or swage-block, to make it a practical job; and if not, why not?

445 A. I cannot, because the bolt-holes in the rail and fish-plate will not fit, as there is nothing to keep the crown at its proper height, and the neck being very thin, in swaging it back to its proper height, without splitting it and rendering it useless.

22. Int. What are the comparative merits of a rail which has been repaired, as to wear, and a new rail from the rolling-mill?

A. The repaired rail will average fully longer in wear than a new rail, because it is swaged out colder than the new iron, which renders it harder.

23. Int. What kind of hammers did you use when you repaired rails on a common anvil?

A. They were about four pounds to four and one-half pounds each in weight.

24. Int. How much is the most of solid welding that you ever done at one heat with the Beebe & Smith machine?

A. Twenty-three and one-half inches.

25. Int. State whether there is any difference in the manner of holding the rail, while being repaired, in the Beebe & Smith, the Cawood, or Whitcomb, or the Central Railroad machine, as to the practical results accomplished.

(Objected to.)

A. No; none whatever; there is a difference in the manner of applying the jaws and opening and shutting the jaws; the rail fits closely in each one, and the result is the same in all the models.

Cross-examination:

1. X Int. Are not the prices which you have named in your direct examination, both for labor, coal, and total cost of mending, the prices paid in gold for the equivalent?

A. They are.

2. X Int. What number of inches were you allowed to mend, and did you mend on each rail, in February, 1865?

446 A. I was allowed to put on three feet at that time. There are 446 rails on which we put 810 feet measurement of solid weld.

3. X Int. Do you cut off or upset the ends of any of the rails in the shop where you work without patching?

A. I cut some and punch them to put the bolts through, but not upset them.

4 X Int. Is this cutting and punching counted in your day's work; and, if so, for how much?

A. It is counted in as one foot for each cutting and the holes punched.

5. X Int. Have you ever used any other form of machine than Beebe & Smith?

A. I have not.

6. X Int. Have you ever attempted to mend a rail in a machine with jaws in which the bottom of the rail is not supported; if so, when?

A. I have, in Windsor and in other shops. I have tried it within the last year, but could not do it without spoiling the rail.

7. X Int. Was the machine one prepared for the purposes of an experiment, or was of your regular machines, in which you attempted to mend a rail of less depth in the neck than the rail for which the machine was made to fit?

A. It was the regular jaws, which I was too lazy to change for one of the proper size, as there was only one or two rails to mend, but it always gave me more bother in the long run.

8. X Int. Have you ever attempted to mend any form than the T-rail?

A. I have.

9. X Int. What other form of rails have you repaired?

A. The U-rail.

10. X Int. Did you repair it on the same machine?

Q. No, I did not; it was on the same machine, to hold the rail, only made to fit the rail.

447 11. X Int. What was the difference in the construction of the machine in which you mended the U-rail and the Beebe & Smith machine, as illustrated in the model?

A. It was the Beebe & Smith machine, only the jaws were made to fit the rail. A solid piece of wrought-iron was fastened or fitted to the anvil-block, between the jaws, coming up into and fitting the hollow of the rail. The bottom portion was supported on the anvil-bed, and not in the jaws, as in the model; the jaws being cut away, and the upper portion above the anvil-bed being nearly straight on the sides, so as to fit the sides of a U-rail.

12. X Int. Did you succeed well in mending a U-rail on that machine?

A. Just the same as with the T-rail.

13. X Int. How long did you continue your experiment of mending rails on the common swage-block?

A. I should think, as nearly as I can recollect, about two months; it may have been a few days over or a few days under.

14. X Int. What was the form of the rails you mended in that way?

A. T-rails and some U-rails.

Redirect examination:

State whether you have ever seen men who are not blacksmiths by trade who have repaired rails by the aid of the Beebe & Smith machine successfully.

I have. I know of three men on the Great Western Road now who

never worked in a blacksmith-shop until they went in as helpers in a rail-shop.

P. A. CRAIG.

CHARLES C. DODGE.

Charles C. Dodge, the next witness introduced, cautioned and sworn, deposeth and saith:

448 1. Int. What is your name, age, residence, and occupation; and how long have you been so employed, and for whom?

A. My name is Charles C. Dodge. I reside in Marshall, Michigan. My age is thirty-six years. I am a blacksmith. I have been so employed for the past eighteen years. Previous to 1852 I worked at the edge-tool business. In 1852 I commenced working for the New Albany and Salem Railroad. I worked for them about three years; then I went at my trade again, the tool business, about a year, perhaps a little over; then I commenced work for the Michigan Central Railroad, and worked till 1862; then I went into the United States service, was discharged in May, 1865, and commenced work for the Michigan Central Railroad, where I am at present, and have been since 1865.

2. Int. What is your present position, and what has it been since you have been employed for the Michigan Central Railroad?

A. I am foreman for the T-rail and blacksmith-shop. I have acted as foreman of blacksmithing for the road-work of the car department for about a year; since then I have had charge of the road and T-rail work.

3. Int. What kind of a machine have you used in repairing railroad rails?

A. First we used the Cawood machine, then the Beebe & Smith machine, and which is still used on the road; we commenced using the Beebe & Smith machine, I think, in 1858.

4. Int. Please state your method of mending a rail on the Beebe & Smith machine or Cawood machine?

A. We put the rail into a crane and swing it into the fire; a common blacksmith's fire; heat it red hot on the part desired to be mended; then swing it into the block and scarf it like rail-model 15472. Then it is placed in the fire again and heated to a welding heat; also, a piece of iron, like the piece of patch-iron 15465, is heated at the same time. When both are at a welding-heat the rail is taken to the block and placed
449 between the jaws; then the piece of patch-iron placed upon the rail and welded to it with sledges; then the edges are trimmed. Then the rail is placed in the side-swage for dressing and finishing up. If it be an end that is mended, we use a flatter to square up the end. After the piece of iron is cut off even with the end of the rail, it is then swung off for use.

5. Int. What is and has been the average day's work, in feet or inches, at the Marshall shop, to each fire, in repairing railroad-rails, while you have had charge of the shop?

A. The average has been about twenty-five feet.

6. Int. Is there any difference in the quality or quantity of the work between the Cawood machine and the Beebe & Smith machine done at your shop? If so, state the difference.

A. I think in quantity it is about the same, but for mending centers the Cawood machine is the best; the rail is more apt to split in the Beebe & Smith machine than it is in the Cawood, for this reason—the jaws of the Beebe & Smith machine have to have more space in the flange to get a rail in without bending; the bottom of the rail will not

touch the bottom of the jaws; by working the head it has a tendency to draw and make the flange out of curve and to make it twist up.

7. Int. What is the kind of rail used on the Michigan Central Railroad at the present time, and what has it been for the past ten or twelve years?

A. At the present they are adopting the fish-rail, like Exhibit 2; in 1858 they adopted the rail like the piece of rail 15,468; before that the wine-glass T-shape rail was used, or the old-fashioned T-rail.

8. Int. What kind of fire is used; the number of men at each fire; the wages paid the men, and the amount of coal used per day, and the cost of the same per ton?

A. A common forge with a blast driven by a fan; three men at each fire—one foreman and two helpers; the foreman receives $2.50
450 per day, and the helpers $1.70 each per day; the amount of coal used per day is about 400 pounds; I cannot say exactly, but I should think it would average $8.00 per ton.

9. Int. What is it costing the Michigan Central Railroad, per foot, for mending or repairing railroad-rails at the Marshall shops?

(Objected to.)

A. About forty-five to fifty cents per foot; for labor alone, about twenty-four cents per foot.

10. Int. Have you, or not, had men that repaired rails successfully on the Cawood or Beebe & Smith machine that knew little or nothing about blacksmithing?

A. I have.

11. Int. Do you have to have different height jaws for the purpose of mending different height rails?

A. We do.

Recross-examination:

1. X Int. How many Smith & Beebe machines and how many Cawood machines are in use in your shop at Marshall?

A. Three of Smith & Beebe machines; one which is used on the T-rail, and part of the time two; the balance is used on frogs. We have none of the Cawood machines now.

2. X Int. Are there any, and, if so, how many, machines of the Cawood patent in use in the shops of the Michigan Central Railroad Company, and where, to your knowledge?

A. There are none, to my knowledge.

3. X Int. Have you ever used a machine of the Cawood pattern or form?

A. I have.

4. X Int. When and where and what it the form of machine known as the Cawood machine illustrated by any of the models now before you?

A. At the Marshall shop, Michigan, I think, in 1857; it was like the model, silver plate, marked "Joseph D. Cawood, Patent, Sept. 9, 1856.'

451 5. X Int. How long did you use the Cawood machine?

A. It was in the shop about two years, in use.

6. X Int. State, if you know, the reason why this Beebe & Smith machine was substituted for it.

A. The reason was that it was a machine that could be made quicker and without having to go to a machinist to finish up. A blacksmith could finish up a Beebe & Smith machine, where they could not fix up a Cawood machine for use without spending more trouble and time.

7. X Int. Do you cut off and repair the ends of rails at the Marshall shops without patching?

A. We cut no rail unless it be cracked or split in the neck, unless a few, to order, to fit certain places. We do sometimes, where a rail does not need a patch, put on, as we term, a "biffer," to square up the end.

8. X Int. What is that operation, a biffer?

A. It is taking a piece of iron, inch or one and a half inches, by one-fourth or three-eighths inch thick, and weld it onto the end of the rail.

9. X Int. Are the processes of cutting or repairing the rail counted in your estimate of day's work? If so, how much?

A. They are; we allow six inches for cutting and six inches for biffing.

10. X Int. Have you ever repaired rails on a common swage-block?

A. I have not.

11. X Int. What are your means of knowing the amount of work done?

A. By being foreman, and having charge, and keeping account, and measuring the day's work.

12. X Int. Do you do twenty-five feet of mending every day with one fire and machine?

A. We do; run over a little some days, and some days fall short, but the average is twenty-five feet per day.

452 13. X Int. What occasions the difference on the amount of mending per day's work?

A. By having shorter or longer welds to make, requiring more rails to be handled and getting out of the shop.

14. X Int. How much on each rail are you allowed to mend?

A. The company do not wish to have more than two feet on a rail; but often times we have to mend more than this. We have no specified limit. We use our own judgment.

Redirect examination resumed:

1. Int. Please state what is about the average amount of rails repaired a day at one fire.

A. About fifteen rails.

2. Int. State whether there is any difference in the practical results in repairing rails on the Beebe & Smith or on the Cawood machine.

(Objected to.)

A. Both machines perform the same work.

3. X Int. State whether they do not support and hold the rail in the same position, if properly made, for repairing the rail.

(Objected to.)

A. The device for holding the rail is precisely the same.

4. X Int. State whether they are not operated on in precisely the same mechanical principle.

(Objected to.)

A. I should say not.

5. X Int. Why not.

A. The Cawood, one jaw is movable, the other is immovable. The Beebe & Smith, both jaws move.

C. C. DODGE.

453 RICHARD SINCLAIR.

Richard Sinclair, the next witness, of lawful age, being duly sworn, deposeth and saith that he is of lawful age; that he resides at Marshall; that he is a blacksmith at Marshall, and working for the Michgan Central Railroad Company; that he has heard the deposition of Charles C. Dodge read, and that the evidence given by him is the same as he would

give except that he cannot testify to the amount of work done, or the cost of the same at the present time, from personal knowledge. And counsel for both parties agree that the testimony of C. C. Dodge may be read as the testimony of the said witness except as to the amount of work done and the cost of the same at present time; and being further interrogated, says:

1. Int. What was the amount of work, and the cost per foot, done per day at the time you had charge of it?

A. The amount done was about 300 inches per day on an average; the cost about forty or forty-five cents per foot.

2. Int. What years did you have charge of it?

A. From May, 1854, to some time in 1857.

3. Int. What machine was used to repair rail at that time?

A. The machine called the Cawood machine was used, like the model marked "J. D. Cawood, Patent, Sept. 9, 1856;" this was the first machine used. This model was the first one used for about two years, then Mr. Cawood made an improvement like model, silver plate, "J. D. Cawood, Patent, Sept. 9, 1856;" then both machines were in operation in the shop at the same time; the latter was used all the time I had charge of the shop. After the first was worn out, we did not build any more after that.

4. Int. Do you now cut off any rails except those that have been repaired in the Beebe & Smith machine which became cracked in the neck while being repaired?

A. Not unless they are ordered for some particular place.

5. Int. Does not a rail which has been repaired wear better than a new or re-rolled rail?

454 A. The part that is mended, if properly mended, will last longer than a new rail.

6. Int. State how much you have repaired in a day, or had done under your supervision, with one fire?

A. We have repaired 350 inches in one day.

Cross-examination:

1. X Int. Is not the expense of material and labor considerable more at the present time than when you had charge of the shops?

A. The expense of material is more, but the labor in the Marshall shop is about the same as before.

2. X Q. Has the price of labor been the same at the Marshall shops from 1864 up to the present time?

A. It has not; the wages are increased by about fifty per cent. all through the whole shops. All the time I had charge of the work it was done by the piece or inch; it was paid for at three cents an inch for ends and four cents an inch for centres; at this rate, for about two years of the time, the company made a deduction in its rates, paying two cents per inch for ends and three cents per inch for centers. About the time I ceased to have charge of it the company made all day-work of it, and blacksmith-helpers were introduced into the business, to whom the company only paid from ten to twelve shillings per day.

3. X Q. How many rails were repaired in accomplishing the 350 inches in one day?

A. I could not state positively as to that; the company sometimes put on some rail six feet to a rail.

4. X Q. Would the amount mended upon each rail affect in any way the number of feet or inches accomplished in a day; and, if so, how?

A. It would affect it; for instance, if a rail required only a small patch

upon the end, it would require a large number of rails to accomplish the amount; and on rails of this description we could not put on as much, as it would take more time in the handling the rails and heating them.

RICHARD SINCLAIR.

455 JONATHAN CLEMONS.

Jonathan Clemens, of lawful age, being duly sworn, deposeth and saith:

1. Int. What is your name, age, residence, and occupation; and how long have you been so employed, and for whom have you been so employed?

A. My name is Jonathan Clemons; my age, 38 years. I reside at Marshall, Michigan. I am driving a team now, teaming. I have been engaged in blacksmithing for the Michigan Central Railroad Company; that is, welding rails for them. I was employed by them about three years, from 1856 to 1859.

2. Int. Are you a blacksmith by trade?

A. I worked four years at it.

3. Int. What kind of a machine did you work on while repairing rails, and what kind of rails did you repair?

A. The Cawood machine; they were called the English rail; they were also called the T-rail.

4. Int. What did you average in feet or inches per day; what kind of fire did you use, and how many men at each fire, and the wages?

A. I calculated to average 300 inches; we used a blast at Marshall, and a bellows in Niles. There were four men at each fire; one man I used as a heater. Paid him twelve shillings per day; two helpers, at ten shillings per day.

5. Int. How many inches or feet have you put on in a day, or known to have been put on by others in a day?

A. I have put on 562 inches; that is the most I have ever known to be put on in one day. I have known 550 inches to be put on in one day; this was done in the same day, and both of them in the same shop, at Niles, Michigan, for the Michigan Central Railroad Company.

6. Int. How many hours did you work for a day's work?

A. That was owing to circumstances; I calculated not to leave
456 the shop until I put on three hundred inches; if I got this done at 4 o'clock, I left; it generally took nine hours to put on the three hundred inches.

7. Int. How much have you put on at one weld?

A. Twenty-two inches.

8. Int. How much coal did you use per day for repairing, and the kind of coal used?

A. I used Blosburgh coal; but how much I cannot say, as I never weighed it. I used all I wanted.

9. Int. Did you ever work on the machine like the model, "J. D. Cawood, Patent, Sept. 9, 1856?"

A. I have. I worked on one like it about eighteen months.

Cross-examination:

1. X Int. How many rails did it take to make up your five hundred and sixty-two inches?

A. I cannot say.

2. X Int. How many feet or inches was the most you put on one rail?

A. Eighteen feet.

3. X Int. Did the large amount put upon one rail facilitate the accomplishment of the large amount done in one day?

A. This rail of eighteen feet was not in the day's work I did.

4. X Int. What was the largest amount mended upon a single rail during the day in which you made the five hundred and sixty-two inches?

A. Not to exceed thirty-six inches in one place. I might have welded both sides of the same rail.

5. X Int. Do you know about the number of rails mended or repaired that day?

A. I do not know how many rails I did handle to mend that day.

6. X Int. Were the rails selected for that day's work?

A. No more than the helpers who selected them, as they were the ones who were running this race.

457 7. X Int. Were the two large days' work which you have referred to accomplished in one day and in the same shop?

A. They were.

8. X Int. Was it or not a trial between two sets of men?

A. It was.

9. X Q. What amount of welding were you allowed to do in your ordinary mending upon each rail?

A. Three feet was the smallest limit I ever had. I welded under the direction of Sinclair part of the time, and I put on just what he marked. If he marked six inches, I put it on; and if he marked ten feet, I put it on.

10. X Int. What was the longest weld that you put upon a single rail in the absence of any special directions from any one?

A. I cannot say. I should say about six feet.

11. X Int. Do you include all the welds upon a rail or a single patch?

A. I mean a single patch.

12. X Int. What is about the largest amount of mending upon one rail in the absence of any special direction?

A. We did not calculate to weld more than six feet upon a rail unless we were very short of rails; then sometimes more was put on.

13. X Int. Does the amount welded upon a single rail effect the amount of welding in feet that you could accomplish in a given time?

A. Yes, sir. The longer the weld (unless too long) helps to count on the number of feet.

14. X Int. What would the amount of welding for rail which would enable you to accomplish the largest results in a given time?

A. From fifteen inches to three feet to a patch.

15. X Int. Did you ever mend rails except with the machines you have referred to?

458 A. I have never mended any without the use of a machine. I have put a few heats of the Beebe & Smith machine; but never use it.

Redirect examination:

1. Int. How many rails did you ever mend where you put eighteen feet on a rail?

A. I used one, certain, by special direction; and I may possibly have mended two from end to end.

2. Int. What proportion of rails in a day's work would require six feet put upon them?

A. A very small proportion at the last of my rail-mending.

3. Int. About how much did they generally require?

A. From six inches to two feet on an end.

4. Int. State whether you did not frequently put on, in repairing road-rails, 350, 375, 400, and 450 inches per day.

(Objected to.)

A. I frequently put on 350; but calculated never to quit till I had put on 300.

JONATHAN CLEMONS.

FREDERICK MARKER.

A. My name is Frederick Marker; my age is fifty-two years. I reside in Wayne, Michigan. I am a blacksmith. I have been so employed ever since I was large enough to blow a bellows. I was employed by the Michigan Central Railroad. I commenced for them when they first commenced the road, and have worked on and off for them about fifteen years. I left them about two years since. I worked for them in Detroit, also in Wayne, about three years; also, Lake Station about three years; also, at Chelsea about two years; also, at Ann Arbor about one year to two and one-half years, in repairing and mending the rails. I do it the same as stated by C. C. Dodge in his testimony. The average number of inches put on by me was about three hundred inches
459 per day. We had three men to each fire beside myself. We used about ten tons of good Blossburgh coal every three months to each fire. We used what was called the Cawood machine at first. I used that about three years; as long as I worked at Wayne. Next I used the Beebe & Smith machine. I used it ever since; from five to six years, or all the time I was repairing rails. The first rails I mended were the narrow-head, two and one-half T-rail. The wages of the men acting as helpers I paid nine shillings per day. I received twenty shillings per day when I worked by the day, and my helpers received twelve shillings per day. I have put on from three hundred inches up to four hundred and fifty inches per day. To one weld I put on seventeen and a half inches; fourteen inches was about my average weld. I have repaired from nine to twenty-six rails per day; from fourteen to sixteen rails was my average amount of rails per day. I had orders not to put on more than twenty to twenty-five inches to each patch. Some were only patched six inches on an end. If a rail is properly welded it will last longer than the new rail. I do not know any difference between the Cawood machine and the Smith & Beebe as to the quality or quantity of work done in a day. We used a common bellows. I have employed men who were not practical blacksmiths who could successfully mend rails by the use of these machines. I had one man who was a mason, who never worked in a blacksmith-shop, who would put on from three hundred to four hundred and fifty inches in a day.

Cross-examination:

When I put on four hundred and fifty inches a day I mended from fourteen to sixteen rails. A large portion of the time is consumed in heating the rail. I can take from twenty-five to thirty heats in a day; that is, when a long piece is to be put on I can take more, as the bar is hot for the second heat. I cannot say how many welding-heats I could take in one day when there was only one patch to a rail to put on, as it is very seldom that a rail does not require more than one patch to a
rail. At first I scarfed the rail for repairing it, then I quit it. I
460 cannot say what the average of repairing done upon a rail, as sometimes, when the road was short of rails, we put on more

When there was plenty of new rails we put on less. The lowest limit we had on each rail was from twenty to twenty-five inches on a patch. We can accomplish the most in number of inches per day when we put on from twenty to twenty-six inches to a patch. I have mended a few rails on a common swage-block. As a business of rail-mending I have always used the machine. The mason that I spoke of was a strong man, but the slowest man I ever saw. After I broke him in for rail-mending I put him in as foreman; it took about three months to break him in.

JOSEPH W. SMITH.

My name is Joseph W. Smith. My age is 57 years. I reside at Turner Junction, State of Illinois. I have resided there for the last twelve years. I am a blacksmith. For the last fourteen years I have been engaged in repairing T-rail, most of the time for the Chicago and Galena Railroad, for eight years; and for the past four years for the Chicago & Northwestern Railroad, Galena division; except seven weeks I worked at the same business for the Chicago, Burlington and Quincy Railroad, at Aurora, and five months I was in the service. In repairing a rail I take the rail and hang it into a crane parallel with the block and the forge, swing it into the forge with the the crown or tread down. When properly heated to a forging-heat, I take the rail and placing it in the block, between the jaws, with the tread upward, and close the jaws on to the rail; then the portion needed to be repaired is scarfed like exhibit on iron, marked "15472;" then the rail is placed in the side swage while the rail is hot, then it is swung back into the forge, and a welding-heat put on it. I then place a piece of iron into the forge, of the proper dimensions, and heat it with the rail to a welding heat; when both are properly heated the rail is again placed in the jaws and firmly secured; then the piece of patch is placed upon the portion of the rail scarfed, and it is welded together with sledges; then I
461 take the tool called the top swage and place it upon the top of the rail, and swage it down like iron model No. 15467, forming the upper surface of this rail, then cut off the end of the patch of iron even with the end rail. Then, with a chisel, I trim the furs or burrs off the side of the tread of the rail. Then the rail is placed in the side swage, and a tool put upon it and swaged carefully to correspond with the balance of the side of the tread of the rail. Then it is turned over and the opposite side swaged in the same manner. The rail is then replaced back in the jaws of the block, and with the top swage it is brought to a proper level and finished like iron model 15470. I have worked on a machine like the model, silver plate, "Joseph D. Cawood," the most of the time for the past twelve years. I have used other machines. The first one I used was the Cawood block. The next was like the model marked "Whitcomb machine." Then I worked on a machine like the model marked "Beebe & Smith;" then worked on a machine at Aurora for the Chicago, Burlington & Quincy Railroad, like the model marked "Etheridge machine." In repairing the old-fashioned rail I used to average from 240 to 300 inches per day. The largest day's work I ever did in a day was a little over 400 inches, I think 411, in a day. I used a common Blossburgh coal fire, with a fan-blast. - I had two helpers with me at the fire. I received two dollars per day, and the helpers received one dollar per day. For the last five years I have received $2.25 per day and my helpers $1.60 per day. The aggregate wages is $5.45 per day at each fire. We worked two fires for the last three years. We use on an average about 230 pounds of coal per day at each fire. We use, generally, iron two inches wide and from one-half to three-quarter inches in thickness.

I think the coal cost about ten dollars per ton. I have repaired what is known as the fish-jointed rail, like iron model 15474. We average, to repair this rail, from 15 to 17 feet per day. It is a more difficult rail to repair, the shank or neck being so narrow, and it is a much longer
462 rail to handle, being from 24 to 30 feet, and it requires more care to put a patch on than the old T-rail; that being only 18 to 21 feet, it is much easier to handle. The height of the fish-rail is four inches; the height of the old T-rail is about 3⅜ inches. It used to cost about—for the labor in repairing the old T-rail—the sum of 18 cents per foot. At the present wages it costs about 25 cents per foot. It cost for repairing the fish-rail about 30 to 35 cents per foot for the labor. It costs 8 cents per foot for the coal. It costs about 18 cents per foot for the iron. I have mended rails on a common swage-block like model marked "Common anvil" about five weeks. On that block I used to repair from 5 to 7 feet per day; 7 feet was the largest day's work I ever did on that. We used the same number of helpers and the same amount of coal. It required heavier iron for repairing on the common anvil than where we use the machine. It would cost, as the labor now is, to mend rails on a common anvil about 78 cents per foot, making a difference in the price of labor and the amount of work done in a day about 46 cents a foot; on the old T-rail is about, at 7 feet on the common anvil and 17 feet on the fish-rail, mended on a Cawood block, would make a difference of 10 feet per day at each fire in favor of the Cawood machine. The difference on the T-rail would be from 14 to 17 feet in the Cawood machine. I do not think I could repair the fish-rail on the common anvil, as it upsets the shank when the piece of iron is placed upon the tread and hammered down, so that it prevents putting in the strap which forms the fish-joint, and, in fulling it back to the proper height, it tears the tread off from the shank or splits it in the neck. In repairing rails on the common anvil we used light sledges, about 4 or 5 pounds each, and the foreman used a common light hammer. When we repaired on the machines the helpers used sledges, weighing about 14 pounds each. We repaired about 3 to 5 rails per day on the common anvil; on the Cawood block, 14 rails per day for 26 days. The usual work, year in and year out, is about 9 rails per
463 day. We average about two feet per rail, perhaps a little over.

When I repaired at Aurora it would average some over two feet per rail at the time I was there. There were two machines in the shop, the Cawood and Etheridge machines, one of the Cawood and two of the Etheridge. I repaired at the Aurora shop from 10 to 12 rails per day.

I can't see any difference in the principle of either of the machines as to the method of holding the rail while it is being repaired upon them; they all support and hold the rail in the same position. For repairing, it is necessary that the machine should be made to fit the rail to be repaired, so as to support it on the under side of the tread, and the flange to rest upon the anvil. To make a perfect machine for repairing railroad-rails, if it was only supported on the under side of the tread it would have a tendency either to break the neck of the rail or to lengthen it and make the flange winding. I worked ten hours per day for a day's work on the fish-rail. There are more rails which are repaired on the center, in different places in the center, than on the ends; on the old-fashioned T-rails not so many, in proportion, required repairing on the center; it was more difficult to repair a rail on the center on the common anvil than on the ends of the rail, as it is very hard to keep the rail in shape; it gets winding and out of shape; in the Cawood machine I can repair a rail equally as well in the center as on the end. I have welded

twenty-two inches at one weld on the Cawood block; on the common block from four to seven inches is all that I could do; I mean the common swage-block when I say common anvil.

The cross-questioning reserved for a future time by counsel for defendants.

JOSEPH W. SMITH.

JOHN MCCORMICK.

My name is John McCormick; my age is 39 years; I reside in Chenoa, in McLean County, State of Illinois; my occupation is black-
464 smith; I am in the employ of the Chicago, Alton & St. Louis Railroad Company; four years past, before this, I worked for the same road in repairing rails, but was hired by William T. Ragland; I think it was about four years I was employed by him. My employment on the road was mending rails, making frogs and railroad crossings. I have also worked upon the Lake Shore Road, running from Cleveland to Erie; this was before I came west; I worked there about five years; this was from 1856 till I came west, and I have been in the employ of the Chicago, Alton & St. Louis Road, or doing work for them, ever since. I have repaired rails on the Whitcomb machine, like model marked "Whitcomb machine," while I worked at Cleveland, and all the time I have worked upon the Alton & St. Louis Road. In repairing a railroad-rail I first put the rail into the shop and suspend it in a crane, parallel with the fire and the machine on which the rail is to be mended; then I swing the rail into the fire, with the tread of the rail down, and heat it to a little over blood-red; it is then swung out of the fire and placed in or on the block, sometimes in the jaws, at other times on the block, and if placed in the jaws I close the jaws tight to hold the rail with the tread upward, then clip off the fractured portion of the rail; then I upset the back portion of the scarf; then I prepare a piece of iron to fit upon the scarf to the proper thickness of scarf; the rail is then taken out of the jaws and swung into the fire, and the piece of iron is heated at the same time, both to a welding heat. It is then swung into the jaws again, with the tread upward, and the piece of iron is placed on top of the rail to be repaired, and welded, with the use of three helpers with about fourteen-pound sledges each, the foreman using a light hammer to give directions to the helpers where to strike with the sledge. I then place a top swage on the top of the rail and swage it down like iron model 15467; then the patch iron is cut off even with the rail; then I take the rail and place it on the top of the block and chip off the fins or burrs; the rail is then turned
465 over to the side swages and swaged down to correspond with the other part of the rail, on each side; then the end is squared up with a flatter; then the rail is placed in the jaws and the top swage is again passed over it to finish it up like iron model 15470. When I repaired rails for Mr. Ragland I repaired the old T-rail, I believe; I repaired a few of the fish-joint rail; the height of the old T-rail varied $3\frac{3}{4}$ to $3\frac{5}{8}$ inches; the length averaged from 15, 18, 21, and sometimes 24 feet each. A fair average day's work on that kind of rail was from 18 to 22 feet each day, done in a workmanlike manner. We generally repaired from fourteen to twenty rails per day. I used a fan-blast, three helpers and a foreman; with a bellows-fire, three helpers and the foreman. I received $3.50 per day when I worked for Mr. Ragland, and the helpers were paid about $2 per day. We consumed from seven to eight bushels of coke per day at each fire. Since I have been at work for the

company, Chicago, Alton & St. Louis Railroad, I have repaired the old-fashioned T-rail and the fish-joint rail, although the greater portion is the fish-joint rail which is repaired now. A fair average day's work in repairing the fish-joint rail is from sixteen to eighteen feet; sometimes we pair twenty feet per day; as they are a very heavy rail, the number of rails repaired per day is from eight to fifteen rails per day; the average is about ten to eleven rails per day. We put on from six inches to three feet on a rail in repairing; I should think they would average about eighteen inches to a rail.

I use three helpers at each fire. The helpers receive $1.75 each. The foreman of each fire receives—one $2.75 and the other $3.00 per day. The aggregate cost of the men at each fire would be, for one fire, $8.00, and the other 8.25. The reason of this difference is that one of the foremen is more expert and has worked longer at the business of blacksmithing, although he has not worked so long at mending railroad rails. We use a furnace and bellows to each fire, and about 240 to 250 pounds of coke per day. The amount of iron per foot used is about four pounds to the foot.

466 The rail used on the road is like Exhibit Iron Model No. 3 and Exhibit No. 7 in a fish-joint plate, used to support the rails at the joint on each side. The length of the fish-joint rails are from twenty-two to twenty-eight feet. The generality of them are about twenty-seven feet, and they weigh about twenty pounds to the foot or sixty pounds to the yard. We cut the fish-joint rail. We do not count cutting a rail anything in our day's work in feet or inches. I should think it would be about the same labor to cut the end of the rail and punch the holes for the fish-joint as it would be to put on a patch of eight to twelve inches on a rail.

I do not think the fish-joint rails could be successfully cut without the aid of a machine to hold the tread of the rail up to its place. We have two different-sized jaws to fit the different-sized rails. To repair them and to make them a practical machine, the tread should be supported and the lower part of the rail should be supported at the same time.

We frequently repair the center of the rail as well as the ends. I have put on 15 inches at one heat, and this is generally what we put on at a heat when the rail required this amount at one heat, when our fire was in good order, or from 12 to 15 inches. It is harder to repair the fish-joint rail than the old-fashioned T-rail. The iron will not average as good, and the T-rails are not so heavy to handle.

I manufactured frogs at the shop at Chenoa, and sometimes made them all of steel. Sometimes I put the steel on the points of the iron rail. I suppose I could put the steel on the points of the rail without a machine, but I could do it much better and quicker with a machine. A rail properly repaired will last longer than a new rail. I have repaired iron rails on a common anvil or swage-block. I think I worked on it about a week for Major Ragland. I mended about from eight to nine feet per day with a fan-blast and two helpers. This was the old T-rail. I could not repair the fish-joint rail on a common anvil or swage-block, and do it successfully.

467 I presume I used just as much coal mending on the common anvil as I would in a machine. I do not think the work done on the common anvil or swage-block is equal to that mended on the Whitcomb machine. I have seen men who could mend rails on a Whitcomb block who knew little or nothing about blacksmithing, and who could not repair a rail on a common anvil. At the time I worked for Major Ragland I was the only practical blacksmith in the shop employed in

mending rails. Major Ragland had shops at Springfield, Bloomington, and Chenoa.

The cross-questioning of this witness is reserved for some future time by the counsel, Mr. Jewett, for defendants.

JOHN McCORMICK.

JAMES MONK.

My name is James Monk. My age is forty years. I reside at Chenoa, in the State of Illinois. I am engaged in repairing T-rails for the Chicago, Alton & St. Louis Railroad. I have worked at the shop some five or six years; the first two years as helper, and the last three years as foreman of the fire in repairing railroad rails. I have heard the testimony of John McCormick, and I work in the same shop with him, and should give the same answers as he has given, except that I am not a practical blacksmith, and I have never mended rails on a common anvil or swage-block, and I have never worked at any other shop except the one at Chenoa, with him.

The cross-examination is reserved by the counsel for the defense.

JAMES MONK.

468 *Depositions of the following witnesses, to wit: William T. Ragland, John H. Lakey, Devillo L. Harknels, L. H. Clark, taken before Philip A. Hoyne, United States commissioner, on the 8th day of March, 1870, on behalf of complainant. The complainant present in person and J. N. Jewett, counsel for defendants.*

SAMUEL H. TURRILL
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY. } And in other cases as per stipulation.

WILLIAM T. RAGLAND.

Int. 1. What is your name, age, residence and occupation, and what has been your occupation for the past twenty years?

A. My name is William T. Ragland; my age, fifty-five years. I reside in Bloomington, in the State of Illinois. At present I am superintendent in the construction of a railroad. My occupation for the most of the time for the past twenty years has been master mechanic. I commenced in the year 1850 as master mechanic. I had charge of the Hudson River Railroad, of the car department, furnishing the drawing, superintending the building of them, and contracting for the building and purchasing of material, etc., for the freight and passenger cars. I also had charge of all the material of the road-bed, chairs, etc., for all experiments on the road; also, all models for bridges, etc., on the road, and making the estimate of the building of the same under the supervision of the chief engineer. In the purchase of all the materials of this character of work, the company held me responsible for the quality of all the material on the road, and no wheels or axils were allowed to be used on the road without my approval. I left the road in 1853 and became con-
469 nected with the Chicago & Mississippi Road, since changed to the Chicago, Alton & St. Louis Road, and since then to the Chicago & Alton Railroad; on this Road I was superintendent of all machinery, and had charge of the mechanical department of the road. About August, 1853, I was appointed superintendent of the southern part of the road, from Springfield to Alton, in connection with my other duties. I was connected with the operation of this road until the fall of 1854; after

this I continued on as superintendent of machinery until May, 1856. I then left their employ and was employed by Fowler M. Ray, as the western agent for the Ray Spring Company. I continued in this until the spring of 1858; in the fall of 1858 I became connected with the Chicago, Alton & St. Louis Railroad, in patching rails for them, and continued at this until May, 1865. Since that time I have been engaged in business for myself, and, as I said, I am at present engaged in the construction of railroads.

Int. 2. What kind of machine did you use for repairing railroad rail, and how many, and at what place or places?

A. I used the swage-block known as the Whitcomb machine, operated by a rack and pinion; part of the time we had four and part of the time we had seven machines at Springfield—two machines which run steady. I run two machines at Bloomington for a while, and then moved them to Chenoa; at this place I run three machines up to the time I left there, which was in May, 1865.

Int. 3. Is model marked "Exhibit A, E. B. G, notary public," a correct representation of the machine you used in repairing railroad rails?

A. It is.

Int. 4. Please explain the process of preparing and repairing a railroad bar, using any models for the same now before you.

A. I should take a rail like Exhibit 3, hang it on the crane, and swing the jagged end into the furnace, and take a cherry-red
470 heat on to it; then chip off the faggoted end, like Exhibit T iron rail 15472, then put it back into the fire together with the piece like exhibit marked "Patch iron 15465," taking a welding-heat on the part of the rail prepared for the patch; also the piece of iron to form the patch; then draw it out of the fire and close it between the jaws of the swage-block; lay the patch on and hammer it down with sledges weighing fourteen to sixteen pounds each; after the patch is welded on we cut the patch off even with the end of the rail, then use a top-swage, conforming to the top of the rail, and swage down so as to leave it like exhibit marked "Fish-iron rail 15467;" we then trim off the fins, as shown by the same model; then take it out of the jaws and turn it on its side in the grooves on the block or side swages; we then use a side swage, which forms the side of the rail like exhibit marked "Fish-iron 15,470;" we then place it in the jaws of the swage block again, and finish off the top with a top-swage, and run it through the jaws so that the end projects about two inches over the face of the jaw, and use a flatter and sledge to square up the end, which completes the operation repairing of the rail.

Int. 5. How many men do you use at each fire, the wages of the same, the amount of fuel used per day, and the kind of fuel, and kind of fire?

A. One foreman and two helpers, (3 men;) the foreman $3.00 per day, and the helpers $2.00 each per day; we used eight bushels of coke; we used a close furnace.

Int. 6. What is a fair average day's work, in feet or inches, in repairing rails, as railroad companies usually repair them, with the swage-block?

A. Twenty-five feet per day.

Int. 7. What would be a fair average number of rails per day, as rails are generally repaired, at each fire?

A. I averaged from 14 to 20 rails per day at each fire; I have done as high as 35 per day, averaging about 10 inches per rail.

Int. 8. Did you ever repair rails on what is known as the common anvil or swage block?

471 A. I have repaired rails on a swage-block like Exhibit A, E. B. G., notary public, without the use of the jaws, using only the grooves and flat surface.

Int. 9. How many men did you use at each fire, the wages of the same, the kind and amount of fuel used per day, and the kind of fire, in repairing railroad-rails by this method?

A. Three men, (1 foreman and two helpers;) foreman $3.00, helpers $2.00 each. The fuel used was coke; amount, 10 bushels per day. We used a close furnace.

Int. 10. What amount in feet and inches did you average to repair per day without the use of the jaws?

A. About 8 feet at one fire.

Int. 11. Which method takes the most iron in patching rails, when you use the jaws in patching them, or when you do not use the jaws?

A. When we do not use them.

Int. 12. How much more iron does it take when you do not use the jaws, and why does it take more iron to repair the rail?

A. It requires an eighth of an inch more in thickness to repair the rail without the jaws than it does with them. Without the jaws the rail will upset in the neck during the process of welding the patch on, thereby requiring a thicker patch to keep the top surface on a level with the balance of the rail.

Int. 13. What kind of rails did you repair with and without the use of the jaws?

A. The T-rail, like Exhibit T-iron rail marked "15472." I never mended but a few bars of the fish-plate pattern with the jaws.

Int. 14. By which method was the work done the best, with or without the use of the jaws?

A. The best work that was done was with the use of the jaws.

472 Int. 15. Did you use the same weight of hammers and sledges in repairing rails with the jaws that you did without the use of the jaws? If not, why not?

A. We used lighter sledges, weighing about 12 pounds each, the helpers striking what is known as quick uphand strokes in welding on the patch without the use of the jaws. When using the jaws, we use one heavy sledge, weighing from 14 to 16 pounds, the helpers striking what is known as overhand strokes, by swinging the sledge over the head.

Int. 16. Could you repair what is known as the fish-joint rail and make a practical job of it without the use of the jaws of the machine for holding and supporting the same?

A. From what experience I had had in mending the fish-joint rail, I could not.

Int. 17. What is the expansion of a railroad-rail in height when heated to a welding-heat?

A. A rail 4 inches in height, the expansion from the cold to the welding-heat would be $\frac{1}{16}$ and $\frac{1}{32}$ part of an inch, or $\frac{3}{32}$ of an inch.

Int. 18. Taking a fish-plate rail when cold, and adapting the jaws to fit the same under the tread coming up to the center of the head of the rail, the flange resting on the anvil underneath, what would be the difference in the height of the neck of the rail after it had been patched from what it was before it had been heated?

A. There would not be any; it would be the same.

Int. 19. State whether there would be any difficulty in applying the fish-plates to the rails after they had been repaired, if the jaws were adapted to the pattern of the rail to be repaired, supporting it under the

crown and coming up to the center of the head of the rail, at the same time the rail being supported on the bottom by the anvil.

A. There would be no difficulty in putting it on if the plate was used that was designed to fit that particular pattern of rail.

473 Int. 20. How many different kinds of machines have you seen in use or being used for the purpose of repairing railroad rails, and on what roads?

A. I have seen a machine like model marked "Exhibit A, E. B. G., notary public," also like model marked "Beebe & Smith patent, June 9th, 1857;" these two I have seen in use on the Michigan Southern & Northern Indiana Railroad, now the Michigan Southern & Lake Shore Railroad. I have also seen the same machine like model marked "Exhibit A," etc., on the Chicago, Alton & St. Louis Road, now the Chicago & Alton Railroad. I have also seen it on the Missouri Pacific Road, at their shop at St. Louis; also, on the Pittsburgh, Ft. Wayne & Chicago Railroad; also, on the Toledo, Wabash & Western Railroad, and on several other roads. I have seen a machine like the model marked "Etherage machine" on the Chicago, Burlington & Quincy Railroad, at their shops in Aurora. I have also seen machines like model marked "Whitcomb machine" for repairing the fish-joint rail; this is used on the roads I have mentioned above for repairing the fish-joint rail. I have also seen a machine like the model marked "Ill. C. R. R. Co. machine;" this is used on the Illinois Central Railroad; I have never seen this used on any other road. I have also seen what is known as the Cawood machine in use on several different roads. I have also seen a machine for rolling on the patch to the rail, known as the Bain's patent reversible rolls; I saw this on the Michigan Southern & Lake Shore Railroad, at Elkhart, Indiana; I also saw one on the Illinois Central Railroad, at Amboy, Illinois; I also saw one at Turner's Junction, Illinois, on the Chicago & Northwestern Railroad.

Int. 21. State what difference, if any, there is in the several models, which you have referred to in your last answer, in supporting and holding the rails while being repaired in the jaws of the machine.

A. The same principle exists in all the machines so far as to
474 holding the rails for the purpose of welding on the patch, the only difference, being in the machines, being the mode of closing the jaws for the purpose of holding the rail.

Int. 22. What did it cost you per foot for labor and fuel to repair rails without the use of the jaws for holding the rail while repairing it?

A. One dollar twelve and a half cents per foot.

Int. 23. What did it cost you per foot to repair rails with the use of the machine at the same time, the same having jaws to hold the rail for repairing it, for the labor and fuel?

A. From 36 to 38 cents per foot.

Int. 24. State the difference that there is in repairing railroad-rails with the use of a machine with jaws to support the rail and the use of a machine without any jaws to hold the rail while repairing, for labor and fuel, per foot.

A. From my own experience in mending rails without the use of the jaws, or on the common anvil or block and the use of the jaws, I found the difference to be from 73 to 75 cents per foot in favor of the machine having jaws to support the rail.

Int. 25. State what, if any, the difference is in the wear of the railroad-rail after it has been properly repaired in a machine for the purpose and a new rail when laid in the track, and your experience in these matters.

A. From experiments I have made to test the difference, I found new rails of what is called rerolled iron, or rails that have been cut up and rerolled, and put in the track with the end put in against a rail that had been patched; the new rail, after having been in use three months, was taken out and repaired, the old rail which had been patched still retaining its form and showing no fracture; the same old rail which had been patched remained in the track until its whole length between the patch on each end was entirely worn out; the patched ends still remained firm and showing no fracture. During that time that this old one remained in the track the new rail had become fractured in several
475 places, while the end patched, being against the end of the old rail, still remained firm, showing no fracture.

Q. 26. Please give your reasons why a rail that has been properly patched will wear longer than a new rerolled rail.

A. The old rail while being patched the patch is firmly hammered on, uniting the patch firmly with the old rail; the process of hammering and swaging the iron or patch, the patch at the same time being of a harder nature than the original rail, the process of hammering uniting still more firmly the fibres of the iron, it becomes semi-steelified; being so much harder than a new rail of rerolled iron, it resists the blow of the wheel, as it is struck on it for a longer time than the new rail without becoming fractured.

Q. 27. What is usually the average amount of repairing done to rails on the different roads on which you have seen them repaired?

A. Take them all through, that is, ends and middle patches, they would average about two feet to a rail.

Q. 28. Have you been over the Michigan Southern & Northern Indiana Railroad, and examined the rails that they were repairing, and those that had been repaired, and laid in the track, within the last ten years, and when?

A. I was over that road in 1861, 1862, 1864, 1865, and also in 1869; I was, during each of these times, in the T-rail repair-shops, and saw them repairing rails, and I also examined the rails in the track that had been repaired.

Q. 29. What would be a fair average amount of patching done to the rails at the time you were there and examined them?

A. I measured a number of patches and found them varying from six inches to thirty-six inches, some of them going as high as four feet to one rail; all that I saw and measured, I should think a fair average would be about two feet to the rail.

476 Q. 30. State what, if any, difference there was in the amount of patching put on to the rails in 1869, when they rolled the patches on, and those you saw put on previously to that time.

A. I should think, from what I saw then, that the patches which were rolled on would probably average about three feet to a rail, in 1869, of those that were rolled on.

Q. 31. Please explain how the fish-plates are attached to the fish-rail, when they are laid in the track.

A. The fish-plate, like exhibit marked "Fish-plate Exhibit 4," one of each is secured each side of the rail by bolts, having two bolts, each side of the joint of the rail having the edges beveled to fit under the crown and on the base or web of the rail, as more clearly seen in the model of fish-joint rail marked "Exhibit 2, P. A. Hoyne."

Q. 32. Have you ever made railroad-frogs from T-rails?

A. Yes; I have.

Q. 33. About what is the cost of a T-rail frog, as they are usually constructed?

A. They cost from $65 to $75; the total cost.

Q. 34. Have you ever made them and put steel upon the rails for making frogs?

A. I have made frogs, and only steeled the point of the frogs from 10 to 12 inches.

Q. 35. Have you ever seen them when the side rails have been steeled on the face as well as the point?

A. I have seen them made at different places.

Q. 36. What, if any, is the difference in the wear of a frog in the railroad track which has its point and side rail steeled and one with no steel laid on it?

A. Judging from them that I made, those with a steel point would last about three times as long as *as* one without any steel upon it, and where the side rails were steeled the durability would be the same ratio as those that were steeled at the point.

477 Q. 37. Could, or not, those frogs be properly and substantially made without the aid of the machine with jaws to support the rail, so as to face them with steel?

A. I should think not.

Int. 38. Can you make a draft of a T-rail frog? If yea, please draw one and attach it to your deposition, and make the same "Exhibit frog No. 1."

A. I can make a drawing of a T-rail frog. I have one with me already drawn, which I herewith hand to the commissioner to mark as an Exhibit frog No. 1. The red ink upon the drawing of the rails shows where the steel is put on, usually on the side-rails and point, as shown in the drawing; it would make eight feet of steel upon the rail, the point being steeled two feet and the side rails three feet each at the point where the most wear comes.

Int. 39. Have you, or not, ever made any experiment in patching rails with the bottom taken out of the machine? If yea, when and where did you make such experiment?

A. In October, 1867. I did make such an experiment; this was during the trial of S. H. Turrill et al. against The Illinois Central Railroad; the experiment was made at Gates' blacksmith shop, in the city of Chicago, by practical rail-patchers, under my direction.

Inc. 40. Did you, or not, produce a piece of rail with the result of said experiment in court, and testify to the same at the trial, in 1867, of S. H. Turrill et al. vs. The Illinois Central Railroad Company?

A. Yes, sir; I did.

Int. 41. Please state the result of that experiment.

A. The result was that I first mended one end of the rail with the bottom in the machine—known as the anvil part of the machine—putting the rail through the ordinary process of mending railroad rails. (The original rail is here produced to witness.) I recognize this as the rail on which the experiment was tried; the end which shows the

478 flange of the rail punched out for the spikes is the end mended in the machine with the bottom in, and the other end was mended with the same men, at the same place, with the bottom of the same machine planed out about $\frac{3}{8}$ of an inch; the operation of mending the rail in the machine with the bottom out was done with the same sledges, hammers, and swages, and worked upon in the ordinary way of patching rails. The result of mending with the bottom out of the machine was to curve the rail on the bottom or flange, as shown on the rail now

before me, causing the neck to elongate and crack, and making the rail useless at that end to be put in the track for use. In trimming off the end of the rail, it being then shoved through the block even with the end of the jaws, after cutting down below the point at which the jaws sustained it, the fracture was the same as shown in the model.

Int. 42. Have you, or not, since that time seen rails repaired in different machines with the bottom support taken out? If yea, where and when?

A. I have seen rails repaired with the bottom out of the machine on the Chicago & Alton Road, at Bloomington; also, on the Lake Shore Road; on the Michigan Southern & Lake Shore Road, at Kingsville, Ohio; also, at Norwalk, Ohio, on the same road. I saw the same kind of machines at Cleveland, Ohio, with the bottom out, in the shop, but not at work the day I was there, on this same road. I also saw machines with the bottom out at Lima, Ohio, on the Pittsburgh, Ft. Wayne & Chicago Railroad, in the shop, but it was not in use the day I was there; also, in Sandusky City, or Upper Sandusky, I seen a machine in use with the bottom out.

Int. 43. What was the effect upon the flange and neck of the rail while repairing it in a machine with no bottom support?

A. At Kingsville, Ohio, I was in the shop and saw a number of rails mended; the result invariably was that the neck of the rail elongated thereby, causing the flange or bottom of the rail to curve in one or two instances; at the same shop and at the same time the rail was
479 taken out of the fire and placed in the block, the jaws closed on it, patch laid on, and, in striking with the sledge to weld the patch on, the neck of the rail, about two inches from the under part of the head, was split back for about eight or ten inches; the rail was then put in the fire again, then taken out and cut off beyond the fracture. I also saw the process of mending rails on the same road, at Norwalk, Ohio; the result there was that the neck elongated. After the patch was finished the rail was turned over with the flange up, and placed upon the smooth face of the block, the jaws being closed; a flatter was then put on near or at the end of the rail, and several blows struck upon it by the helper with the sledge, which upset the neck and made the rail the same height that it was when first put into the jaws to be mended. I saw rails mended at the Chicago & Alton shops, at Bloomington; when taken out of the fire, the patch welded on the neck was elongated; after the patch was finished the rail curved on the bottom or flange and then turned over on the block with the flange up, the flatter placed on it at and near the end and several blows struck on it, which upset the neck but took out the curve of the flange and brought the rail again to its proper height; a steel pin the size of the holes through which the bolts pass was driven through the holes by a succession of severe blows, thereby bringing the holes to their original size. The same process was done at Kingsville for rimming or opening the holes, as I have described here.

Int. 44. When did you see this work done at the different places you have described in your foregoing answer?

A. I think about the 1st or 2d day of February, 1870, at Kingsville, Ohio; at Norwalk the same month, same year; at Sandusky City same month, same year; and at Bloomington the same month and year.

Int. 45. Please describe the machine as you found it at Kingsville, Cleveland, and Norwalk, Ohio.

A. At Kingsville the two machines known as the Whitcomb
480 block; on the machine next to the fire or furnace there was a

casting of a U shape, the top of the casting being flat, about the width of the whole block. It was placed on a block of wood brought up close to the end of the block, nearly on a level with what was originally the bottom of the block, or the anvil part of the block, and firmly secured there. On the opposite end of the block was a roller cast-iron, about five inches in diameter—it may have been a little more or a little less; that roller was the extreme length of the width of the block; there was a strap of wrought iron bolted on each side of the block-stand well secured to the block, the roller having a journal on each end of it. The journal-pins were put into holes in the strap made for that purpose, which brought the upper surface of the roller on a level with the casting, which was secured to the upper end of the block, as I mentioned first. The two blocks at Kingsville and Cleveland were of the same pattern and had the same attachments. The two swage-blocks at Norwalk had the roller attached, as described in the blocks at Kingsville; the additional castings were not on them.

Int. 46. (The witness is here shown model marked Whitcomb or Cleveland block and asked whether or not it is a correct representation of the machine used at Kingsville and Cleveland, and at Norwalk, except the false anvil attached to the end of it.)

A. The model shown me is a correct and faithful representation of the block at Kingsville and at Cleveland. It is also a representation of the block at Norwalk, as far as regards the rollers, the false anvil not being on it.

Int. 47. Did or not at the shop in Norwalk they have a support to the rail between the block and furnace on a horizontal line with the roll at the back end of the machine?

A. I am not positive; but I think the roll was placed about half the distance between the furnace and the end of the swage-block, on a horizontal line with the roll on the opposite end of the block; which last-mentioned roll acted as a support to the rail while putting on a patch in the middle of the rail.

481 Int. 48. About how much was the machine which you saw at Bloomington, and Lima, and Sandusky *been* planed out?

A. Well, I should judge the one at Bloomington was planed out about $\frac{1}{2}$ an inch. I measured it one day and think it was a little less than $\frac{1}{2}$ an inch; those at Lima were planed out from $\frac{3}{4}$ to $\frac{7}{8}$ of an inch; those in Sandusky were planed out $\frac{5}{8}$ of an inch.

Int. 49. Is it or not your opinion and experience that to make a practical machine for repairing railroad-rails that the rail should be supported simultaneously on the under side of the crown or head of the rail and the flange?

A. That has been my experience in using the machine, that to hold the rail in every part of it except that part to be operated upon, the jaws of the swage-block should be a perfect fit with the rail, and the anvil should come up so that the web or bottom of the rail should at the same time, while it is held by the jaws, have a bearing on that part of the block known as the anvil, with the rail so clamped in the jaws. I think it is the only way by which a rail can be properly mended and held in its original shape during the process of mending.

Int. 50. Please describe the machine used for rolling a patch on in a short and concise way, known as "Bain's patent."

(Question objected to.)

A. The machine used for rolling on patches is composed of four rollers, the top and bottom roll held in its position by two upright standards, and driven by gearing so constructed that the machine is reversible

that is, that its motion can be reversed. The bottom roll is a smooth surface, some six or seven inches, more or less, in width on its face; I did not measure it. The top roll is a grooved roll, made to slip on or off the shaft, to change at any time. The groove in the top roll is made to conform to the top of the rail to be operated upon, having a lower edge for the sides of the groove, extending down to the side at the center of the crown of the rail. On one side is a side roll, made to fit the
482 side of the rail to be operated upon from the top of the flange to the under part of the crown of the rail, coming up nearly to the line of the lower edge of the top roll; the other side roll fits the opposite side of the rail in the same manner; that roller is movable by a cam and lever. I omitted to mention that the top roll has a piece cut off from the face-edge of it, that is, the grooved edge, thereby leaving a flat place on the outer periphery of the roll. The two side rolls are so constructed that they can be taken out and others placed in their stead of a different pattern, if necessary. On the extreme right-hand end of the rolls is what is known as the swage-rollers; they are made to slip off and on, to put on a different pattern. Those two rolls conform to the sides of the rail when laying between the rollers; the two revolve at the same time; the centers are on a vertical line with the space left between them, sufficiently large to insert the end of the rail to be operated on. There are two small vertical rollers, placed opposite the centers of the side rollers, before mentioned, to sustain the web or flange of the rail during the process of side-swaging or side-rolling. There is also a saw attached to the same machine, used to cut off the rails to the proper length.

Int. 51. Is, or not, the rail at the point of pressure supported on the under side of the crown and flange at the same time while rolling the patch on?

(Objected to.)

A. It is so supported.

Int. 52. Is there, or not, a fin formed on the side of the rail after the patch has been rolled on, as seen in model marked "Fish-iron rail 15467?"

(Objected to.)

A. There is a similar fin to the one on Exhibit No. 15467, but not in all cases so much as shown there. I observed sometimes a very small fin, at other times a very large one.

Int. 53. If you should remove the bottom roll or support, what would be the effect upon the rail in rolling the patch on?

(Objected to.)

483 A. The pressure of the top roll would force the under part of the head of the rail between the side roll downwards, thereby elongating the neck of the rail, making the rail much higher at the point operated upon than the cold part, and causing the web of the rail to form a curve at the point at the end of the heat where the patch is put on.

Int. 54. Are the rolls, or not, so constructed that after the patch has been rolled on the part mended will be of the same size and height as the cold part of the rail?

(Objected to.)

A. Yes, sir, it is. Those that I examined were the same in every particular.

Int. 55. When did you see these rolling-mills in operation at Elkhart, Amboy, and at Turner Junction?

(Objected to.)

A. I first saw the one at Elkhart in the fall of 1869; it was shortly

after it was put up there. I saw the one in Amboy on the 17th of February, 1870. I saw the one at Turner Junction in the fore part of the present month, but it was not in operation; it was undergoing repairs.

Int. 56. About what is the cost of such a machine, with the appurtenances thereto, for the purpose of rolling a patch on to a rail?

(Objected to.)

A. I do not know of my own knowledge. I learned from the foreman at Amboy that the total cost was $25,000. This would include the building, which I should judge would cost between $3,000 and $4,000.

(Answer objected to as hearsay.)

Cross-examination:

X Int. 1. How many times have you been examined as a witness on this Cawood patent?

484 A. If my memory serves me right, I think this is the second or third time, I am not positive which—come to think, it is the third time.

X Int. 2. What is your present business?

A. I am at present employed in the construction of a railroad from Bloomington to La Fayette, or at least I was up to the time the frost knocked us off.

X Int. 3. When did you quit mending rails?

A. I think it was in May, 1865.

X Int. 4. What business have you been in since that time?

A. I have been in two or three different kinds of business since that time. I was proprietor of a small brewery at Bloomington for a short time. I sold out of that business and was employed to construct a railroad from Bloomington to Normal; a part of the road was operated by horse-power—that part within the city limits. I afterwards, after finishing that road, occupied my time collecting up my bills and settling up my brewery affairs. I then worked for a short time on the Indianapolis, Bloomington & Western Road; I superintended the grading under the contractor. I then left that employ and went into the present employ of the Bloomington & La Fayette Road.

X Int. 5. At whose instance have you made the examination of the several rail-shops and mending-machines referred to in your direct examination?

A. On this latter examination, made this month, at the instance of Mr. Turrill; on some occasions I had business of my own to attend to.

X Int. 6. When the jaws were closed upon the rail, holding it in a position for mending, in the Kingsville and Cleveland machines, what was the space between the bottom of the rail and the top of the roll on the one side and the false anvil on the other?

A. I did not measure the distance, but judge it to be about an eighth of an inch, perhaps less, what we call barely cleared; those were
485 the machines at Kingsville I speak of now. At Cleveland I put a cold rail in the machine, closed the jaws firmly on to it, and on one side of the web of the rail it cleared about an eighth of an inch; that is, it cleared the attached roll on the other side; the web of the rail barely touched the anvil.

X Int. 7. In mending the end of the rail in that machine, would there be any support to the bottom of the rail on the outer end; that is, the end being mended?

A. No, sir; no support under the web of the rail or the flange.

X Int. 8. How long did you mend rails upon the grooved anvil?

A. I will not be positive; I think it was five days; it may have been five and a half days.

X Int. 9. Did you ever make or have charge of any other experiment in mending the rail upon jaws without the bottom support than the one referred to as made pending the trial in the case of S. H. Turrill et al. vs. the Illinois Central Railroad Company, in October, 1867?

A. No, sir.

Redirect examination:

Int. 1. Is, or not, cutting off rails a part and parcel of patching and mending them?

A. It is so considered when the work is done by the contract; we are allowed six inches of patching for every end cut off in counting the work up.

Int. 2. Is it, or not, necessary that the rail should be supported at the bottom and the under side of the crown to make a good job in cutting it off?

A. I always considered it so, and always had them cut off in the machine.

Int. 3. In patching rails of a special pattern, and one of a lesser height, how did you manage to have the rail have a bottom support without changing the jaws?

A. While we were patching rails having the same configuration
486 of the head and not being high enough to touch the anvil, we had a piece of iron to slip under the rail to give it the support.

W. T. RAGLAND.

JOHN H. LAKEY.

Int. 1. What is your name, age, residence, and occupation, and how long have you been so employed?

A. My name is John H. Lakey; my age is 44 years; I reside at Turner Junction, Dupage County, State of Illinois; I am engaged as a blacksmith; I have charge of the shops of the Chicago and Northwestern, Galena division, at Turner Junction since June, 1854, except one year.

Int. 2. Have you ever repaired rails on a common anvil?

A. I have.

Int. 3. For how long a time, and how many fires did you use in repairing rails on a common anvil?

A. Nearly two years; between one and two years. I use three fires.

Int. 4. What kind of rail did you repair, and what was a fair average day's work in feet or inches on a common anvil at each fire?

A. The ordinary T-rail; I repaired about 7 feet per day at each fire.

Int. 5. Did you, or not, have to have practical blacksmiths in repairing rails on a common anvil, and how many men did you have at each fire?

A. I had to have practical blacksmiths at each fire; one smith and two helpers at each fire.

Int. 6. Have you, or not, ever repaired railroad-rails on the Cawood patent anvil or swage-block, and for how long a time, and how many fires have you run in repairing rails with said machine?

A. I have repaired rails on the Cawood machine; I think I
487 commenced on the Cawood block in 1857. I have run three fires at one time; I commenced with one fire, and after about three months I commenced with the second fire, and some time during the year 1857 I put on the third fire; sometimes we have run three fires, and sometimes only one fire. In the year 1859 I was absent from June to the February following.

Int. 7. What kind of rails did you repair during this time with the Cawood machine?

A. The ordinary T-rail and what is called the fish-plate rail.

Int. 8. What was a fair average day's work in repairing the ordinary T-rail in the Cawood machine at your shop, in feet and inches?

A. From 225 to 250 inches per day at each fire.

Int. 9. Did you use skilled blacksmiths at each fire for repairing rails on the Cawood machine, or what kind of men did you use?

A. I used skilled blacksmiths part of the time, and part of the time men that were no blacksmiths at all.

Int. 10. What kind of fire, and how blown, kind of coal and the amount used at each fire per day?

A. We used an open blacksmith fire, with Blossburgh coal blown by a blast; we used from 275 to 300 pounds of coal per day at each fire.

Int. 11. What, if any, was the difference in the amount of coal used in repairing rails on the Cawood block and the common anvil per day at each fire?

A. With the same blast there would be no difference in the amount of coal used.

Int. 12. What, if any, was the difference in the weight of the sledges and hammers used on the Cawood machine and the common anvil?

A. In welding on the common anvil we used hammers weighing about 4 pounds; on the Cawood machine we used sledges weighing about 13 pounds each.

488 Int. 13. What was a fair average in feet or inches per rail, as you repaired the T-rail at your shops?

A. This average would vary every month, or at different seasons of the year. I should think from 20 to 30 inches per rail, some months more than this.

Int. 14. How many feet or inches have you known to have been put on by the aid of the Cawood machine in one day at one fire, and at one welding-heat?

A. I have known 350 inches to have been put on in one day, and I think more, but I cannot state the exact amount more. I have seen put on at one welding-heat 22 inches, the full width of the machine.

Int. 15. Could you or not repair the fish-plate rail and make it a practical business on the common anvil?

A. I could not.

Int. 16. Is there or not any difficulty in repairing the fish-plate rail on the Cawood machine adapted to that rail in applying the fish-plates after it has been so repaired?

A. There has never been any fault found, or very seldom, if any, fault found in the fish-plate not fitting; with proper care on the part of the men there would be no difficulty in the fish-plates fitting.

Int. 17. About what has been the cost of the coal per ton used at your shops in repairing rails, and the wages of the men at each fire, for the past 8 or 9 years?

A. This would vary in different years; the highest we have paid was $12, and the lowest $7, per ton; the company paid for this, and I had nothing to do particularly with it. The wages of the men have varied with the different years; in 1854 we paid $2.00 for blacksmiths and $1.13 for the helpers; and in 1859 or 1860, we paid $1.80 for blacksmiths, and helpers $1.00 per day; in 1866, 1867, and 1868 and 1869 we paid $2.25 for blacksmiths and $1.60 for helpers per day.

489 Int. 18. Have you or not ever used machines for repairing

rails that gave no bottom support to the rail? If yea, state fully the results of such use.

A. I did in 1861 and 1862 use the machine called the Mason & Davis machine. I think that came from Michigan City. This machine did give only a partial support. I used this about two months. We then threw it out, as we found that it caused the rails to split at the shank on the end. I never used a machine which gave no support at all.

Int. 19. In your experience, is it, or not, necessary that the rail, when in the machine to be repaired, should be supported on the bottom of the flange on the under side of the tread of the rail at the same time in order to make it a practical machine for repairing railroad-rails?

(Objected to by counsel for defendants.)

A. I think it should be supported on the bottom as well as under the head of the rail to successfully repair the T-rail.

Int. 20. Were you or not in court at the trial of S. H. Turrill et al. vs. The Illinois Central Co., in October, 1867, and then and there testify as to your experience in the use of machines with the bottom support out, or nearly so?

(Objected to by counsel for defense.)

A. I have been in court, but cannot give the date from memory, and gave evidence, or testified, in regard to partial support. The title of the case was, I think, as stated.

Int. 21. What difference, if any, is there in the wear of railroad-iron which has been patched as compared with new iron in the track?

A. I think it was about the same—that which had been patched and the new iron. It was very seldom that a patch ever came off after it was put in the track.

Int. 22. As a general thing does or does not the portion of the rail patched wear longer than new rails?

A. It is hard to say which would wear the longest. I am
490 satisfied that the mended part would wear longer than the balance of the rail. I have had but little experience personally in this.

Int. 23. How is the Chicago & Northwestern Railroad Company repairing their rails at the present time?

A. They are using Bain's patent reversible rolls for the purpose.

Int. 24. About how much does that machine, with the necessary appliances, cost, as constructed by the Chicago & Northwestern Railroad Company?

(Objected to by counsel for defendants.)

A. I cannot state what it would cost. I could only make an estimate. I should guess about $25,000, with the fixtures, shops, patents, etc.—it may be more and it may be less.

Int. 25. What are the functions of the bottom roll in the machine you have spoken of—Bain's patent?

(Objected to.)

A. One of the functions is to draw the rail through the machine; the other is to support the bottom of it on its way through.

Int. 26. Suppose you take away that bottom roll, or cut it away from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch, what would be the effect upon the rail to be repaired in the machine?

A. The effect would be that it would not draw the rail through the machine, and it would not weld on the patch.

Int. 27. What are the functions of the side roll of Bain's patent, and how operated?

(Objected to by counsel for defense.)

A. In my opinion, they act together to keep the rail to original size while the rail is passing through the rolls. They are operated by friction.

Int. 28. Is not one of the side rolls movable and the other stationary?

(Objected to by counsel for defense.)

491 A. One is movable in the machine we have in use.

Int. 29. What are the functions of the top roll in the Bain's patent?

(Objected to by counsel for defense.)

A. My opinion is that it acts in conjunction with the bottom roll in drawing the rail through, at the same time it welds the patch and shapes the head or top of the rail.

Int. 30. Do you or not have side rolls with different-shaped faces, for the purpose of fitting a fish or T rail on its sides?

(Objected to by counsel for defense.)

A. We have side rolls to fit the different pattern of rails.

Cross-examination waived.

J. H. LAKEY.

D. L. HARKNESS.

Int. 1. What is your name, age, residence, and occupation, and how long have you been so employed?

A. My name is Devillo L. Harkness; my age is 43 years; I reside in the city of Chicago, county of Cook, and State of Illinois; I am a commission merchant; I have been so engaged about five months; before this I was superintendent of railroads for some nine years.

Int. 2. Please state on what railroad you have acted in the capacity of superintendent.

A. On the Milwaukee & Horicon Railroad; on the Horicon division of the Milwaukee & St. Paul Railroad; on the Chicago & Great Eastern Railroad; and the 2nd division of the Chicago, Columbus & Indiana Central Railroad.

Int. 3. Have you had any experience in the wear of repaired railroad-rails? If yea, please state your experience fully, as compared with new iron, after both have been laid in the track.

492 I have had experience in regard to this matter; while connected with the Milwaukee & St. Paul Railroad, I laid some repaired rails in conjunction with new iron, and I think that the repaired rails worked fully equal or better than the new rail. My impression is that there was about a mile of new rails and about half a mile of repaired rails; these were laid in a continuous line between stations; a portion of the new iron had to be taken out to be repaired within two years, while none of the repaired rails had to be taken out while I was connected with the road—some three years.

Int. 4. What kind of a machine were those rails repaired on, if on any?

A. They were repaired on a machine like the model marked "Beebe & Smith patent, June 9th, 1857."

Cross-examination waived by Mr. Jewett.

DEVILLO L. HARKNESS.

LEVERETT H. CLARK.

Int. 1. What is your name, age, residence, and occupation, and how long have you been so employed, and for whom?

A. My name is Leverett H. Clark; my age, forty years. I am a civil engineer. I have been so engaged about twenty-one years for different railroad companies. For the past fifteen years I have been in the employ of the Illinois Central Railroad Company.

Int. 2. How long have you been chief engineer for the Illinois Central Railroad Company, and does the repairing of railroad-rails come under that department, and for how long a time has it been under your supervision?

A. I have acted in this capacity about ten years. The repairing of railroad-rails does come into this department at the present time. The mending or repairing of the railroad-rails has been under the charge of the engineer's department about nine years, although there has
493 been some rails repaired at the machine-shops which were under the charge of the foreman of the shops, although all such rails were reported to me in monthly statements by the foreman of the shop, or through my subordinates to my office.

Int. 3. What kind of a machine or machines have you used the past nine years for the purpose of repairing railroad-rails for the said Illinois Central Railroad Company on the line of said road?

A. Well, the most of the machines for hand-mending have been a similar machine to the model now before me, marked "Ills. C. R. R. Co. machine." We have also had one or more part of the time, which is called, I think, the Beebe & Smith machine. For nearly a year past we have been repairing rails by machinery. We have also had another machine at work at Weldon shops. I do not know the name of it. It is sometimes called the bayonet-machine, like the model now before me, marked "Bayonet-vise."

Int. 4. Have you or not during the last nine years, in repairing railroad-rails, used different machines or jaws adapted to different pattern of rails?

A. We have.

Int 5. About what has been the cost of coal per ton used in the rail-repairing shops since 1861 to 1868?

A. The price has ranged from about $6 to $12.50 per ton since 1861.

Int. 6. About what was the cost of iron used for patching rails from 1861 to 1868 per pound, and the different sizes used?

A. Well, I think from about 3⅝ cents to upwards of 7 cents per pound, or between 7 and 8 cents per pound.

Int. 7. Have you or not had rails repaired by contract within the last nine years? If yea, please state that contract as near as possible. For how long a time were they so repaired, and by whom?

494 A. Well, I should say no, as to having all the rails repaired by contract, although we have had some work done, or rails repaired, by which the labor was performed at a specified price, or by contract, if you call it so. We had a man at work at Champaign, and we paid him an agreed price for the labor. I think his price for doing the work was from two to three cents per inch for weld. I think his work was stopped in 1868, and I think he commenced in 1862. It was about six years. His name was William Illingsworth.

Int. 8. How many fires did he operate, and did it cost the Illinois Central Railroad Company more or less by this contract than it did when the company operated their own fires for an equal amount of patching?

A. Sometimes he operated one and sometimes two fires. I am unable to say whether it cost the company more or less.

Int. 9. What wages have you paid the foreman at the fires for patch-

ing rails, and what the helpers, and how many men have you employed at the fire, between the years 1861 and 1868?

A. We had no men which we called foremen. We had what we called rail-smiths and helpers. The wages we paid the smiths have ranged from $1.50 to $3.40 per day; the helpers, from 90 cents to about $1.75 per day. Usually we employed three men at each fire—one smith and two helpers.

Int. 10. How many machines have you used in each year in repairing railroad-rails from 1861 to 1868 or 1869?

A. I could not tell this.

Int. 11. How many did you use in 1861?

A. To the best of my recollection, six or seven machines.

Int. 12. How many in 1867?

A. I am not positive, but my recollection is eighteen machines.

Int. 13. How many did you have in use in 1868 or 1869?

A. We had about twenty in 1868.

495 Int. 14. About what has been the price of new railroad-iron and rerolled rails between 1861 and 1868?

A. New rails used on the Illinois Central Railroad have cost from about $56 to about $120 per ton, and rerolling rails for this road has cost from $25 to about $50 per ton.

Int. 15. Is, or not, the low prices given in your answers to all the foregoing interrogations the prices prior to the year 1863?

A. In regard to rerolling iron and new rails, it is the lower prices named; for rerolling and for new rails are prices previous to 1863, and also for labor, and also for the iron and coal.

Int. 16. About what has been the cost to the Illinois Central Railroad, in making and constructing a machine like model "Ill. C. R. R. Co." machine?

A. I do not know exactly, but I am under the impression that it is somewhere from $50 to $60.

Int. 17. What name, if any, is given to the machinery which you have spoken of, for repairing rails, for about the last year, and how many of such machines have you in operation on the line of the Illinois Central Railroad Company?

A. They call them "Bain's patent reversible rolls;" we have two of them in operation.

Int. 18. About what has it cost the Illinois Central Railroad Company to put these two machines in operation, with their appliances for mending railroad-rails?

(Question objected to.)

A. I cannot state very near; or, in other words, I do not know what it has cost.

Int. 19. What, in your opinion, to the best of your knowledge, is about the cost for the said two machines and their appliances? Please state it as near as you can from recollection.

(Objected to by the counsel for defendants.)

496 A. I suppose the cost of the buildings and machinery has been about $35,000.

Int. 20. Do you, or not, repair different patterns of rails by the same set of rolls?

(Objected to.)

A. We do by a change in the rings.

Int. 21. What change would you make in repairing the old T-rail, and what is known as the fish-plate rail?

(Objected to.)

A. We should change the rings and friction-rollers.

Int. 22. Which rollers are designated as friction-rollers; the top and bottom rolls or the side rolls?

(Objected to.)

A. The side rolls.

Int. 23. What effect, if any, would it have upon the rail if the rolls were adjusted to a special pattern of rail to repair it, if you should then remove the bottom roll a half or three-fourths of an inch from the bottom or flange of the rail?

(Objected to.)

A. I have never seen it tried, and could not say.

Int. 24. In your opinion, as chief engineer of the Illinois Central R. R. Co., what would the effect be upon the rail in repairing it as per the last interrogatory?

(Objected to.)

A. I should require more time to consider that point before I could answer it.

Int. 25. About what amount in feet and inches are you averaging to repair by the two machines constructed after Bain's patent, per day, on the Illinois Central Railroad?

(Objected to.)

A. About four hundred feet per day to each machine.

Int. 26. About what is the average per rail in feet or inches, as you repair with the Bain process?

497 (Objected to.)

A. The quality of rails that we are repairing now would be about forty inches to each rail.

Int. 27. When you repaired rails by machines like model marked "Ills. C. R. R. Co. machine," did you employ practical blacksmiths, one at each fire?

A. We did.

Int. 28. Did you pay the smiths at the rail-fires as much per day as you did practical blacksmiths who worked exclusively at blacksmiths' business?

A. Well, we did not have a uniform standard of pay; we paid these smiths about the same price as ordinary blacksmiths, at the places where they were employed.

Cross-examination:

X Int. 1. Have you ever had occasion to notice the process of mending rails upon any of the machines you have spoken of in your testimony?

A. I have seen rails repaired by the different machines.

X Int. 2. Have you had any machine in operation on the Illinois Central Railroad like defendant's model "Beebe and Smith?"

A. We have had one at work more or less at Centralia, and one for a short time at Champaign.

X Int. 3. What number of rails were mended on the machines represented by that model between the years 1861 and 1868?

A. In 1866 we repaired, at Centralia, on that machine, 542 rails; I do not know how many we repaired at Champaign.

X Int. 4. How long has this machine, represented by model marked "Bayonet Vise," been in use, and at what place?

A. Some over two years, at the Weldon shops.

X Int. 5. Have you witnessed the mending of rails upon that machine?

498 A. I have.

X Int. 6. When?

A. Well, within a week I have seen it in operation several times. I saw some rails mended on it last Saturday.

X Int. 7. Did you notice whether or not the rail was supported upon the bottom during the operation of mending?

A. I did; it was not supported on the bottom.

X Int. 8. What amount of space was there between the bottom of the rail and the anvil underneath?

A. Fully half an inch.

X Int. 9. How did the machine, as thus used, operate?

A. It operated well.

X Int. 10. Did you notice the result upon the rail when so held and mended; and what was the character of the work?

A. I did; the work was well done in every respect, and left the rail in good shape.

X Int. 11. Can you state about the number of the rails which have been mended upon that machine at the Weldon shops prior to the year 1869?

A. Between six hundred and seven hundred, prior to 1869. I mean by this that this number was repaired in 1868. There may have been some repaired on the machine prior to this, but I am not certain.

X Int. 12. From your observation of the working of that machine, and your general knowledge of the subject of rail-mending, please state whether or not, in your opinion, a bottom support is necessary during the process of patching?

A. I do not think it is.

X Int. 13. What is the height and thickness of the neck or web of the rail now in use on the Illinois Central Railroad, and what is the name given to the rail?

A. It is about 1⅞ inches in height from its connection with the head and base, and 9-16 of an inch in thickness; it is called the fish-plate rail.

499 X Int. 14. What is the width of the top or crown of the rail?

A. 2⅜ inches.

X Int. 15. Can you state what has been the average cost to the Illinois Central Railroad Company of mending of rails by the several machines that have been referred to up to the year 1868?

A. It has been about 5 cents per inch of weld.

X Int. 16. How much has it been per rail?

A. About 82 cents.

X Int. 17. In your examination you have given the extreme prices of labor, coal, and iron, and in rail-mending, between 1861 and 1868; would the average during that time be above or below the medium of those two extremes?

A. I am under the impression that the average would not be far from the medium of those extremes.

X Int. 18. What amount of iron is generally used per foot or inch in rail-mending?

A. I am unable to state now.

(The complainant objects to each and every of the foregoing cross-interrogatories, and to the several answers thereto, in regard to the use, or opinions in the use, of the machine with the bottom out, as incompetent and irrelevant to any matters in issue in each of the foregoing cases.)

Redirect examination:

Int. 1. What difference, if any, is there in the Beebe & Smith machine

and the Illinois Central machine in holding and supporting the rail while being repaired in the jaws of the machine?

A. The mode of operating in one machine is by a movable jaw on one side, while in the other both of the jaws move. I do not think there is any particular difference in holding and supporting the rail while being repaired.

500 Int. 2. Is or not the rail supported in either of the machines at the same time on the bottom of the flange and under side of the crown or ball, as represented by the two different models, the Illinois Central and the Beebe & Smith patent, June 9, 1857?

A. Yes.

Int. 3. How many rails have you seen repaired in the machine, like model marked "Bayonet-vise," prior to the last Saturday, March 5, 1870?

A. I have seen the machine at work at various times; I could not say how many rails I have seen repaired in it.

Int. 4. At whose instance or suggestion did you go to see the machine last Saturday, March 5, 1870, and how many rails did you then see repaired in the machine?

A. I had some conversation with the Illinois Central Railroad's attorney, and I do not remember which of us suggested it. I did not see but one finished on Saturday. I saw more than one operation in repairing.

Int. 5. For what purpose was the rail to be used that you saw repaired, and how many rails do they repair there per month to be laid in the track of the Illinois Central Railroad?

A. We shall use it for such purposes as we see fit for the use of the road. We are not repairing rails at Weldon now as a business; all the rails repaired heretofore at Weldon have been for use in the track of the Illinois Central Railroad, or tracks kept in order by that company.

Int. 6. Has or not the machine like model marked "Bayonet-vise" been principally used for the purpose of making rail-frogs on it since being set up in that shop?

A. It has been used both for making frogs and for repairing rails.

Int. 7. What would be the effect, if any, in the fish-joint rail in repairing it, if nothing but a bottom support, having discarded the jaws, and having nothing to support it under the crown?

501 A. I have never tried it.

Int. 8. In your opinion, as chief engineer of the Illinois Central Railroad, what would the effect be, you having had charge of rail-repairing for the said road for the past eight or nine years?

A. My opinion is that it might be likely to set down the head so that the fish-plate would not fit well.

Int. 9. In your opinion, could you or not repair the fish-joint rail on the common anvil or swage block and make it a successful and paying business to the company?

A. I think there are some better modes of repairing rails than on a common anvil.

Int. 10. In figuring the extreme of repairing rails and giving the average cost of the same in your cross-examination, what do you figure as the expense, or included in that expense, to arrive at the amount stated?

A. Labor, and all materials used in repairing rails, and keeping the tools in order.

L. H. CLARKE.

502 *Depositions of the following witnesses, to wit, M. McMillen, S. Lawler, John Ginien, J. B. Illingsworth, M. Cornelius, K. A. Huntoon, Alvin A. Stone, Andrew Maxwell, Peter Worrall, Richard Colford, John C. Ragland, William Sheard, Alexander Snodgrass, Jeremiah Donelly, on behalf of complainant, as per stipulation of July 6, 1869, and December 14, 1871.*

SAMUEL H. TURRILL ET AL.
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY. } And in other cases as per stipulation.

THE STATE OF OHIO
Allen County, ss:

Be it remembered that on the 9th day of May, A. D. 1864, personally appeared Matthew McMillen, Samuel Lawler, and John Ginien before one T. M. Robb, a notary public in and for the county of Allen and State of Ohio, to testify, and in truth to say, on the part and behalf of the plaintiffs in a certain suit or matter of controversy now depending and undetermined in the circuit court of the United States of the eastern district of Michigan, wherein Samuel H. Turrill and Charles Wormley are the plaintiffs and the Michigan Southern & Northern Indiana Railroad Company are the defendants.

And the said witness, Matthew McMillen, being of lawful age, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter of controversy aforesaid, did thereupon depose, testify, and say as follows, to wit:

503 MATTHEW MCMILLEN.

I am thirty-seven years of age. My residence is in Lima, Allen County, Ohio. My occupation is that of foreman of the blacksmith-shop of the Dayton & Michigan Railroad Company, in Lima, Ohio.

I have worked at the business of blacksmithing for about sixteen years, and have been engaged as foreman of the blacksmith shop and of the T-rail shop of said company, in Lima, Ohio, for about two years.

We have been and are now repairing T-rails in said company's shop with a block known and called the Whitcomb or Cleveland block, of which the model, marked "Exhibit A, E. B. G., notary public," is substantially the same as the machine we use, except as to the size. We use two machines: one is two feet across the face and the other is twenty-eight inches. We average about fifteen rails a day of ten hours to each fire, and average welding is about two feet to the rail, and runs from six inches to three and a half feet per rail. We employ three men to each fire, one blacksmith and two helpers. We pay blacksmiths $2.25 per day and helpers $1.75 per day. We use about seven bushels of coke to each fire per day. Coke costs sixty cents per bushel. We use a furnace with a fan-blast.

I consider this block of great value in the repairing of railroad-iron. I have seen these blocks on the Pittsburgh, Ft. Wayne & Chicago Railway and on the Cleveland & Toledo Road. Men work successfully at repairing rails on this block who know nothing of ordinary blacksmithing. Railroad-rails cannot be successfully repaired on a common anvil, for the reason that there is nothing to support the rail and keep it in its place while welding. The web or neck of the rail is liable to crush down, and, restoring it to its original height again, it is very apt to crack and separate, and it is almost impossible to keep the rails straight.

504 We usually take two heats on the Whitcomb machine, one in preparing and scarfing the rail and the other in welding and finishing up.

(Signed) M. McMILLEN.

SAMUEL LAWLER.

And [redacted] said witness, Samuel Lawler, being of lawful age, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter of controversy aforesaid, did thereupon depose, testify, and say as follows, to wit:

My name is Samuel Lawler; my age is thirty-seven. I reside in Lima, Allen County, Ohio. My occupation is that of a T-rail patcher. I have worked at it, as a helper, about five years, and have had charge of a fire about two years. I worked about a year and a half at blacksmithing in the old country. We use the machine known as the Whitcomb block, of which the Exhibit A, E. B. G., notary public, is substantially like it except as to its size. The blocks are two feet or more across the face of the jaws, and operate in the same manner as the model referred to.

The repairing of rails is done in the following manner: The rail is placed in the fire and suspended at one end by a crane. When sufficiently heated it is taken out and placed in the jaws of the machine, where it is scarfed and the lip raised on the tread of the rail. It is then returned to the fire, together with a piece of iron of sufficient size to replace the defect in the rail. When properly heated the rail is placed in the jaws of the machine, and the piece of iron is welded to the rail with hammers and sledges. Then we use a top swage to form the repaired part to conform to the balance of the tread of the rail. We then shove it out and square up the end; after which we trim off the fins or surplus iron from the edge of the tread of the rail, and then place it in a side swage, and then use a side hand-swage for smoothing and
505 finishing up the sides. We never take but two heats in this operation. We generally average about fifteen rails a day in repairing. While I worked on the Cleveland & Columbus & Cincinnati Railroad, at Cardington, we put on from one to three feet on a rail, averaging about two feet to the rail. That is more than we now average on the Pittsburgh, Fort Wayne & Chicago Railway. Part of our time is employed in cutting off rails, and in loading and unloading railroad-iron. If we worked constantly at repairing, we would put on about twenty feet a day as we now work. We could put on from 12 to 15 inches, if the rails required it, in about the same time that we use in putting on from 6 to 8 inches, which is about the amount that we usually repair at this time at each end of the rail.

We use about seven bushels of coke at each fire per day, and have two fires in operation. We have three hands to each fire—one blacksmith and two helpers. The wages of a blacksmith is $1.75 a day, and the helpers $1.65 per day each. We use a furnace and fan-blast.

I have mended T-rails on a common anvil with side swages, and worked in that manner for over one year. We used to average eight rails a day, and the average work on each rail would be about one foot. We used an open fire and about ten bushels of coal per day, with the same number of hands we now work.

We worked in this way by contract, at five shillings per rail for the labor, and the company furnishing iron, coal, and tools.

It requires more iron to patch rails on a common anvil than it does on the block.

It would take about one-quarter more iron to repair rails on a common anvil than it would when done on the block, and it would take fully as much coal for each day's work to repair eight feet on a common anvil as it would to repair twenty or twenty-five feet on a block. I consider the Whitcomb block an improvement of great value in repairing T-rails.

506 I have seen them used and am using them now on the Pittsburgh, Fort Wayne & Chicago Railway. I have also seen them and worked them on the Cleveland, Columbus & Cincinnati Railroad. I have also seen them in the shops of the Dayton & Michigan Railroad and the Little Miami & Cincinnati Railroad.

In welding on the common anvil we had to use light hammers of about three pounds weight. In using heavy hammers we would crush the rail down and get it out of shape, so that it would be almost impossible to get it into proper shape again.

(Signed) S. LAWLER.

JOHN GINIEN.

And the said witness, John Ginien, being of lawful age, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter of controversy aforesaid, did thereupon depose, testify, and say as follows, to wit:

I am thirty-two years of age on the twenty-eighth day of May, A. D. 1865. I am now a blacksmith's helper in the shops of the Pittsburgh, Fort Wayne & Chicago Railway, at Lima, Ohio. I have worked for the last eight years in the same shops with Samuel Lawler, whose testimony is given above. I was present when he gave testimony in this case, and have heard it read after signing, and I fully concur with him in all his statements in his foregoing testimony. I have had charge of a fire and operated in repairing T-rails as a blacksmith for over ten months.

(Signed) JOHN + (his mark) GINIEN.

THE STATE OF OHIO,
Allen County, ss:

I, Thomas M. Robb, a notary public within and for the county of Allen and State of Ohio, under and by virtue of the acts of Con-

507 gress, do hereby certify that the reason for taking the foregoing depositions, and the fact is that the witnesses reside outside of the limits of the eastern district of Michigan, and more than one hundred miles from Detroit, where the court at which the trial of said cause is expected to take place is appointed by law to be held. I further certify that on the 9th day of May, A. D. 1865, I was attended by S. H. Turrell, one of the plaintiffs in said cause, and by the witnesses, who were of sound mind and lawful age; and the witnesses having been by me carefully examined and cautioned, and sworn to testify the whole truth, the depositions were by me reduced to writing in the presence of the witnesses, who subscribed the same in my presence, and I have retained the said depositions in my possession for the purpose of transmitting the same by mail to the court for which the same was taken. I further certify that I am not of counsel or attorney for either of the parties in said depositions and caption named, or in any way interested in the event of the said cause.

In testimony whereof I have subscribed my name and affixed my notarial seal this 9th day of May, A. D. 1865.

[SEAL.] (Signed) THOMAS M. ROBB,
Notary Public of Allen County, Ohio.

[5-cent stamp.]

(Endorsed:) Filed Dec. 16, 1871. Wm. H. Bradley, clerk.

JOHN B. ILLINGSWORTH.

Deposition of Joshua B. Illingsworth, taken on the part and behalf of plaintiffs, on the 14th day of June, A. D. 1861, at Chicago, Illinois, before Phillip A. Hoyne, a United States commissioner for the northern district of Illinois.

508 And the said witness, Joshua B. Illingsworth, being of lawful age, and having been by me cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter of controversy aforesaid, did thereupon depose, testify, and say as follows, to wit:

My name is Joshua B. Illingsworth; I am thirty-five years old; I reside in Blue Island, Cook County, Illinois; I am a blacksmith, and have been engaged in said business for the last twenty-four years.

I know the plaintiffs and defendant. I have known the plaintiff Wormley about a year, and plaintiff Turrill only a few days.

I am acquainted with a machine known as Cawood's patent swage-block. It is used for the purpose of repairing railroad T-rails. I have seen a copy of the patent issued to Cawood, and the machine I have seen corresponds with said patent. I became acquainted with said machine about five years ago, in Marshall, Michigan, in the workshop of the Michigan Central Railroad at that place. I worked under the inventor, Mr. Cawood, at that place, who was the master-mechanic of the Michigan Central R. R. shops.

I have worked with said machine in Blue Island, Cook County, for the last four years and a half.

Cawood's patent swage-block consists of a cast-iron block, with one stationary jaw and one movable one, made in a suitable shape to fit the side of a T-rail, moved by two cams, or eccentrics, fastened to a shaft made for the porpose of holding the rail while it is being repaired.

I know of other ways of mending T-rails. There is a way of mending with a common anvil or block, which I have never used much. These are the only two ways of mending that I know of. With the common anvil and three men, nine feet could be mended in a day. With Cawood's patent swage-block and three men twenty-five feet of T-rails can be mended in a day. I have worked, and can work, twenty-five

509 feet a day; and I average about twenty-four feet a day, with one fire in each case.

The Cawood patent swage-block will and does mend rails much the best of the two methods—more than double the best—and I would not have a rail put on the track that is mended on the common anvil, because the common anvil breaks the fibres on the neck of the rails, whereas Cawood's does not.

It costs twice as much, with the same amount of labor per foot, to mend the rails with the common anvil as it does with Cawood's patent swage-block.

It requires more time to learn to do work in mending rails on the common block than it does on the patent swage-block. I have often known

rails which were mended on the common anvil to break, but I have seldom if ever known of one breaking which was mended by the Cawood patent swage-block.

(Signed) J. B. ILLINGSWORTH.

Subscribed and sworn to before me, at Chicago, Ill., this 14th day of June, A. D. 1861.

[SEAL.] (Signed) PHILIP A. HOYNE,
U. S. Com., N. D. Ill.

MAXWELL CORNELIUS.

Deposition of Maxwell Cornelius, taken on the part and behalf of plaintiffs, on the 11th day of January, A. D. 1862, at Cincinnati, Ohio, before H. D. Paul, U. S. commissioner for southern district of Ohio.

And the said Maxwell Cornelius, being by me carefully examined and cautioned, and duly sworn to testify the whole truth and nothing but the truth, saith:

By S. H. TURRILL:

1. Int. What is your name, age, occupation and place of residence?

510 A. My name is Maxwell Cornelius. I am fifty years of age. I am a blacksmith, and superintendent of the blacksmith-shops and T-rail shop of the Cincinnati, Hamilton & Dayton Railroad Company; and I reside in Green Township, Hamilton County, Ohio.

2. Int. Do you know the parties plaintiff and defendant in this cause?

A. I have just made the acquaintance of Mr. Turrill, and know the railroad company by reputation.

3. Int. How long have you worked at the blacksmithing business, and at what place or places?

A. I have worked at the blacksmithing business since I was twelve years of age. My father was a blacksmith, and I used to help him from the time I was able to. I served an apprenticeship at scythe-making for six years in Pennsylvania, near Pittsburgh. Since then I have worked in Cincinnati, and I have been superintendent of the blacksmith and T-rail shops of the C. H. & D. R. R. Co. since 1852.

4. Int. State whether you have in use on the Cincinnati, Hamilton & Dayton Road any machine for mending rails. If yea, state where, when and under what circumstances you first used it and became acquainted with it.

A. When we first commenced patching the rails I never had seen any machine for mending the rails, nor heard of anything of the kind. This was something like five or six years ago. Then we went to work and made a block to mend the rails with, and we found that in working a rail in an open block we would get the rail crooked, and it took too much trouble to keep it straight, and after working some time with an open block, we got up the machine we now use.

5. Int. Please describe that machine which you now use.

A. It consists of a large cast-iron block, weighing about eight hundred pounds, having fixed jaw shaped like one side of the rail to be mended and a movable jaw shaped like the other side of the

511 rail, which is moved backwards and forwards so as to admit putting in the rail and taking it out, and to hold it fast while in the block by means of a crank working a half circle upon the movable jaw which slides in V grooves.

6. Int. Have you any knowledge or experience of the business of mending railroad-rails without the use of said machine? If yea, state fully all your knowledge of such business, and your means of such knowledge or experience in particular.

A. When we first commenced mending rail we used the common anvil or swage block with side dies, but we found the rails would get bent in welding, and that it required something to hold the rail in its place while it was hot.

7. Int. State the cost of mending railroad-bars per foot without the aid or use of said machine, and of the manner or of the ways and manners in which they can be so mended without said machine, according to your knowledge and experience.

A. I never estimated the cost of mending the rails in any other way, and therefore could not tell, and there is no other mode of mending rails except these two ways that I know of.

8. Int. State how many feet can be mended by one forge in a day; how many men it requires, and the wages of each man, and the aggregate of all the hands employed at one forge, on the common anvil.

A. I think the average of what we have done on the common block was about eight feet; we had three helpers and a blacksmith. The wages of a blacksmith were ten dollars a week and of the helpers seven dollars a week each.

9. Int. State the cost per foot of mending railroad-bars with the machine now used by you; also the number of feet which can be mended by one forge in a day, the number of hands required to each forge, and the wages of each hand, and also the aggregate of the wages of all of the hands required or employed at one forge in mending rails with said machine.

A. The cost of mending with the machine, as we figure it, including labor and coal, is fifteen cents a foot, and the iron costs ten cents
512 a foot, average. We have mended some days as high as thirty feet in a day, and the average of what we do with this machine is about twenty feet and along there. We work two helpers and one blacksmith with this machine. We give the blacksmith a dollar and a half a day, and the helpers seven dollars a week each. The aggregate wages are three dollars and eighty-three cents a day for each forge. We have four machines, but only work two at present.

10. Int. Is there any difference in the amount of material required to mend rails between mending them with and without the use of said machines? If yea, state fully what the difference is, and which requires the most material.

A. The machine requires less material. The common anvil takes more iron, but I cannot tell exactly how much. The reason why the common anvil takes more iron is, that not having the machine to hold it, the soft iron is continually getting out of shape and requires to be patched and fixed afterwards, while the machine holds it to its place and requires no further patching or trouble, and it requires as much coal to mend eight feet on the common anvil as it does twenty-five on the machine. We use from five to eight bushel of coal a day on a forge.

11. Int. State whether railroad-bars can be well and properly mended without the use of said machine. If not, state and explain why not.

A. I would say they could not. The reason why is that the rail is constantly getting out of shape with a common anvil, and only a practiced blacksmith can do anything with it, while on the machine the rail is held to its place, and any man who can heat a rail properly can mend with the machine. All the men we have now patching rails I took off the

gravel-trains and learned them how to heat and set them to work patching rails—that is all they know about blacksmithing.

12. Int. State how many railroad-bars you average to repair at one forge per day with this machine.

A. We generally counted on an average about twelve rails per day to each fire.

513 13. Int. State the number of feet or inches of railroad-bars averaged to be repaired.

A. The repairing on each bar averages about two feet. If the ends are good, we often repair five or six feet on a bar.

(Signed) M. CORNELIUS.

KINSMAN A. HUNTOON.

Deposition of Kinsman A. Huntoon, taken on the part and behalf of plaintiff, on the 14th day of November, A. D. 1861, before D. Darwin Hughes, a United States commissioner for the district of Michigan, at Marshall, Michigan.

And the said witness, Kinsman A. Huntoon, being about the age of thirty-five years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter in controversy aforesaid, I did carefully examine the said Kinsman A. Huntoon, and he did thereupon depose, testify, and say as follows, viz:

I reside in Marshall, in the State of Michigan; am thirty-five years of age; am a machinist by occupation; at present a member of the first regiment of Michigan engineers, at Camp Owen, in the city of Marshall. I have been master-mechanic of the Michigan Central Railroad shop, at said Marshall, for four years and ten months. I commenced occupying that position in November, A. D. 1856, and remained in it until September, A. D. 1861.

I know Mr. Wormley, one of the plaintiffs, and never saw Mr. Turrill but once until this day. I know the defendant by reputation. I have known Mr. Wormley for five years, at Detroit and Marshall. I have been engaged in the business of a machinist about sixteen years. Twelve years of the time I was engaged in building and repairing locomotive-engines. I followed the business of machinist at the Boston Locomotive Works, at the Amoskeag Manufacturing Company's

514 shops, and at the Michigan Central Railroad shops, in Detroit and Marshall, Michigan.

I am and for about five years last past have been acquainted with a machine for mending railroad-bars, known as Cawood's patent swage-block or anvil. I first became acquainted with said swage-block or anvil at the Michigan Central Railroad Company's shop, at Detroit, in the summer of the year A. D. 1856; but I was more perfectly acquainted with it after taking charge of the Michigan Central Railroad Company's shop at Marshall, in the fall of said year 1856, and from that time down to the present.

When I took charge of the Marshall shop, I found it in use in the shops, and it was continued in use, under my direction, by the men in the shops. For nearly two years the machine was under my direction, and I used it daily, by my men, for the balance of the time I was in the Marshall shop. The men and machines were transferred to another department, but remained in the shop, as before. They and it were put

under C. H. White. It was used in the shop more or less during the entire time I was in the shop.

The machine is best described by the model of it, which is here present. [The model is here produced, and is one marked "Joseph D. Cawood, patented September 9, 1856;" made of ebony, and set on a block of mahogany.]

It consists of a movable jaw for holding a T-rail in an upright position while in process of welding. The jaw may be moved in many ways. The one on the model is moved by cams. The movable jaw is combined with another, by the assistance of which it holds the rail in the aforesaid upright position.

The other jaw in this model and in the machine itself is stationary.

The anvil consists of recesses, (or swages,) for the purpose of giving shape to the edge of the rail.

I was acquainted with Joseph D. Cawcod, the alleged patentee
515 of the machine. I became acquainted with him in the summer of 1856, and, to the best of my recollection, I knew him about one year from that time at Marshall, and until he left to go South. When I first knew him he was master-mechanic at the said Marshall shop, and he continued there until about the 20th of November, A. D. 1856. I cannot tell when, by whom, or where the first machine I saw was made. I first saw the machine in use at the Michigan Central Railroad shop at Detroit, in the summer of 1856—I think about August, but I cannot be positive.

It is too much taxing my recollection to state the number of them I have ever used. I have seen so many—say from ten to fifteen; saw them all during the last five years. I think the second machine I saw was in use at the said Marshall shop. I saw some at Michigan City, Niles, Jackson, and Ann Arbor, and other stations along the Michigan Central Railroad where they were used. They were all in use. I never saw them in use on any other road than the Michigan Central.

Int. State fully all the knowledge and experience you have of the use of the machines; where, by whom used, and what purpose.

(Defendant's counsel object to the question for irrelevancy.)

A. The machine was used at the stations I have named by the Michigan Central Railroad Company for mending T-rails. The length of time it was so used I cannot say, but it is more or less during the last five years. It having been for three of the five years out of my special superintendence I cannot state specifically how much it was used. During the first two of the five years it was generally used.

Int. Have you any experience or knowledge as to mending railroad-bars without the use of this machine?

A. I have no such experience, and no knowledge except by information. I know nothing of it by observation, and can't tell the expenses or cost from my own experience. I have no knowledge of
516 mending rails on a common anvil except by judging from other blacksmith-work. I have seen rails mended on a common anvil, but not under my charge or direction.

Int. Is there any difference in the amount of material required to mend rails between mending them with and without the use of said machine?

A. It is my opinion there is.

Int. State what such difference is and which method requires the most material.

A. The most material would be used in mending them on a common anvil. I can only estimate the difference.

Int. What is your estimate of the difference in the amount of material required?

(Counsel for the defendant objects to the question on the ground that it sufficiently appears that the witness has not the knowledge and experience to authorize him to give his estimate or opinion.)

A. I should think from one-third to one-half more would be required on the common anvil.

Int. Can railroad-bars be well and properly mended without the aid of said machine?

A. It is my opinion that they cannot without it or some substitute equivalent to it. In mending on the common anvil the neck of the rail becomes thickened while welding, and in restoring it again to its shape the fibers of the iron are liable to be parted, which would cause the rail to break in the neck when put in use.

Int. Are you or were you ever acquainted with a machine for mending railroad-bars or rails called and known as Beebe & Smith patent swage-block?

(Counsel for the defendant objects to the question on the ground of irrelevancy.)

A. I have been. I was acquainted with it at Michigan City, Indiana, but I cannot fix the *the* time when.

517 Int. How many of the last-mentioned machines have you seen?

(Counsel for the defendant objects to the question for irrelevancy.)

A. Say six. I cannot tell exactly.

Int. Where have you seen them?

(Counsel for the defendant objects to the question on the ground of irrelevancy, which objection, by consent of counsel present, is to apply to all testimony relating to the Beebe & Smith machine.)

A. At Detroit, Marshall, Niles, and Michigan City, in the possession of the Michigan Central Railroad Company.

Int. Describe the said Beebe & Smith patent particularly, and state wherein it resembles and wherein it differs from the said Cawood patent swage-block, and mention all the points of resemblance and difference in construction, principle, and operation fully.

(Counsel for defense make a further objection to the question on the ground that there is evidence of a higher nature in existence.)

A. The machine consists of the same anvil as the Cawood block. Two movable jaws, operated by a lever, and combined and held together by a combination of the wedge and inclined plane for the purpose of holding the rail in an upright position while in process of welding. It resembles the Cawood block in the movable jaw, and in the manner in which it holds the rail. It differs from the Cawood block in the power or means used in holding the jaws in their position, both of which jaws are movable, instead of one, as in the Cawood block. I have stated that the anvil is the same in both blocks. The principle of the two machines is the same in my opinion. They differ only in the mechanical means for applying the principle.

Being cross-examined by counsel for the defendant, the said witness, Kinsman A. Huntoon, says:

518 Int. Do you wish it to be understood that you know nothing of the said Joseph D. Cawood, or of his supposed block, patented by him, for mending railroad-rails, prior to the year 1856?

A. Yes, sir; I wish it so understood.

Int. Was the Cawood block, so called, or the Beebe & Smith block, in use at the shops of the Michigan Central Railroad in Marshall, at

the time of your leaving the employ of the company, in September last?

A. The Beebe & Smith block was in use.

Int. Can you tell when, where, and by whom any machine which you ever saw for mending railroad-rails was invented or made?

A. I can tell you where some five or six have been made, and that is by the men under my charge at the Marshall shops.

Int. Can you tell me who invented the machine referred to by you in your last answer?

A. I can tell by information from the Patent-Office, being letters-patent to Joseph D. Cawood and others. This is the only knowledge, or means of knowledge, I have.

Int. Are you aware of the fact that there are a number of railroad companies in the United States which dispense entirely with all patented machines or blocks for mending railroad-rails?

A. No, sir.

Int. Are you aware of the fact that said companies will not use any patent for this purpose, and that the rails so mended—that is to say, without the aid of any patented machine—are equally serviceable with those mended by a patented machine, and that the cost is less than the cost of mending the rails in or with a patented machine?

A. No, sir.

The direct examination of the witness being, by an arrangement between the counsel on both sides, resumed by the plaintiffs' counsel, the witness testified as follows:

I am not acquainted with a machine for mending railroad rails known as Mason & Davis patent swage-block, except by an examination of the model.

Int. Describe it.

(Counsel for the defendant objects to the question for irrelevancy.)

A. It is a block possessing the same recesses and forms as the Cawood block.

(A model is here produced to the witness, marked "Mason & Davis, patented May, 1858.")

It has two movable jaws, opened by a lever and closed by their own weight.

Int. State wherein it resembles and wherein it differs from the Cawood block, and mention particularly all the points of resemblance and difference between them in construction, principle, and action.

(Counsel for defendant objects to the question on the ground that it is not the best evidence the nature of the case admits of, and for irrelevancy.)

A. It resembles the Cawood block in its jaws, when closed, and in the manner in which it holds the rail while being welded or repaired.

It differs from it in construction by being composed of two movable jaws instead of one, by the jaws lifting to free the rail instead of sliding, and in being operated by a lever.

I consider the same principle combined in the two machines. By principle I mean the effect produced.

Int. What would be the difference in the amount of work accomplished by the same number of men on a common anvil and on a Cawood swage-block?

A. I can only give an opinion on it. It is that from three or four times as much work could be accomplished on the Cawood swage-block with the same number of men.

Int. You say that by the principle you mean the effect produced; what do you mean by the effect produced?

520 A. We combine mechanical powers to produce an effect upon metals together with forms. Powers and forms are, in the swage-block, used to preserve the shape or form of rails while repairing. The preservation of the shape of the rail is what I mean by the effect produced, and that is alike in the two machines.

The cross-examination being, by an arrangement between the counsel on both sides, resumed by the defendant's counsel, the witness testified as follows, to wit:

Int. Has the principle of these machines any means by which it is generally known in mechanics?

A. It is generally known as a swage or gauge block.

Int. Is the principle of holding the rail in the process of mending a swage?

A. It is my opinion that it is.

Int. Do principles apply to effects, or to causes lying back and under effects?

A. I believe I have explained what I understood by principle while speaking of these machines, which was the effect produced.

Int. Is there any such principle in mechanics as a gripe?

A. There is such a thing known as a gripe.

Int. You say the principle in the Cawood block and that in the Beebe & Smith block is the same; can you give a better definition of the principle than, viz, it is the principle involved in opening and closing the human hand? That is to say, to gripe, to hold fast, to let loose. If you say you can, please define the principle definitely, in words that best express the principle.

A. I don't think the principle can be better defined.

Int. Is there any other principle than the one just illustrated involved in the common vise?

A. There is not.

Int. Do you mean by the effect produced the power to produce effects or the result of the power?

521 A. I mean the result of the power. The principle is the power or means, and the effect the result of the power or means.

Int. Is this a new or an old application of principle that you refer to?

A. I consider it new in relation to the effect produced.

Int. In giving your opinion of the work of the same number of men with and without the aid of the block, did you give it from your own experience in the business?

A. I gave it from my own experience in mending rails with the block and without the block by estimation and knowledge of other blacksmithing. I never had experience in mending rails on a common anvil.

Int. How many men do you employ to mend rails with the block, without the assistance of any machinery except the block?

A. One blacksmith and two helpers.

Int. How many rails, as they are ordinarily taken to be repaired, would those men ordinarily mend in a day of ten hours?

A. It would depend on the number of feet mended on each rail.

Int. How many feet are ordinarily, on an average, mended on a rail?

A. We have mended six feet on a rail in the middle. We ordinarily mend from six inches to ten inches on each end.

Int. When you mend from six inches to ten inches on each rail, how many feet could one blacksmith and two helpers, with a block, mend in one day of ten hours?

A. From twenty-five to thirty feet.

Int. Are you aware of the fact that a number of railroad companies in the United States use a common anvil, in combination with grooves or swages fitted to the sides of the rail, for mending railroad rails, discarding all patented machines for this purpose?

A. No, sir.

522 Int. At what price, per foot, lineal measure, including the flanges, centers, and ends of the rail, do you think you can mend or repair with the Cawood machine?

A. At the time I was using the block it was from thirty-two to thirty-six cents. I have good reason to believe that it is done for less than that now.

Int. Do you wish it to be understood that your answer is based upon your opinion merely, or upon an accurate account kept of the actual expenditure?

A. It is based upon my recollection of an account kept of actual expenditures.

Being re-examined by counsel for the plaintiffs, the witness testified as follows, viz:

Int. Do you call the jaws a swage or machinery for holding the rails while being repaired?

A. I call each jaw separately a swage, and the two combined a machine for holding the rails while in process of being repaired.

Being re-examined by counsel for the defendant upon cross-examination, the witness testified as follows:

Int. Does the said Cawood machine, in any way, perform the office of a swage, or is it a machine for holding the rail while in the process of swaging?

A. According to Webster's definition it is not a swage, but a machine for holding the rail in place while being swaged.

Int. Wherein, then, does the said Cawood machine differ from a common vise, which you say involves the application of the same principle?

A. By having its two jaws formed to the shape of the rail, and in being applied to holding T-rails while being mended; or, in other words, having its principle applied to produce a different effect.

523 Int. Do mere shapes in mechanics, or conformity of one thing to another, come of the necessity of the case or of invention?

A. It is my opinion they come of invention.

Int. Is it an invention to make a block of iron conform to a T or otherwise shaped rail, or does it come of the necessity of the case?

A. I could consider it an invention.

(Signed) K. A. HUNTOON.

ALVIN A. STONE.

Deposition of Alvin A. Stone, taken on the part and behalf of plaintiffs, on the 11th day of December, A. D. 1861, before John A. Savage, jr., a United States commissioner for the district of Wisconsin, at Milwaukee.

And the said Alvin A. Stone, being about the age of thirty-three years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the controversy aforesaid, I carefully examined the said Alvin A. Stone, and he did thereupon depose, testify, and say as follows, to wit:

My name is Alvin A. Stone; my age, thirty-three years; my occu-

pation, that of a machinist; and my residence, the city of Milwaukee, Wisconsin. I know the plaintiff Mr. Turrill, but only know the plaintiff, Mr. Wormley, by reputation. I have known the plaintiff Turrill about five or six weeks. I know the Michigan Southern & Northern Indiana Railroad. I have been a machinist for some fourteen or fifteen years. I have been engaged as such at Holyoke, Mass., for a couple of years, in the Hartford & New Haven Road about five years, and for the balance of the time on the Milwaukee & Chicago Road. I am acquainted with the machine known as the "Cawood patent anvil or swage-block." I first became acquainted with it in Michigan City, Indiana, in the year 1855 or 1856. I have had no experience in the work-
524 ing of the machine. I have had knowledge of the mending of bars of railroad-iron without the use of such machine. We have mended bars of railroad-iron on the Milwaukee & Chicago Railroad, for the past three years, by the use of the common anvil. I am master mechanic in said road, and have the superintendence of all such work, and the keeping of all the accounts of the mechanical department of said road. The average cost to our road, at the present time, and for the last two or three years, of mending railroad-bars per foot, has been sixty-nine or seventy cents, using in the work of mending the common anvil. I have never known of but two methods of mending railroad iron, which are the two I have mentioned, one by Cawood's patent, and one by the common anvil. The average work, per day, of mending on the common anvil, is nine or ten feet. We employ usually, at each fire, three men, one "boss" blacksmith and two helpers, and sometimes, when we have a bad rail to be mended in the middle, we have to have an additional man. In the use of the common anvil we experience great difficulty in keeping the rail up in its proper shape during the mending, and afterwards we are also very apt to thicken the rail in the neck while repairing it on the common anvil.

(Signed) ALVIN A. STONE.

Subscribed and sworn to before me December 11, 1861.

(Signed) JOHN A. SAVAGE, JR.,
U. S. Commissioner, District of Wis.

ANDREW MAXWELL.

Deposition of Andrew Maxwell, taken on the part and behalf of plaintiffs, on 21st day of December, A. D. 1861, before Thomas S. Blackmar, United States commissioner for the eastern district of Michigan, at Detroit.

And the said Andrew Maxwell, being about the age of forty-one
525 years, having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter in controversy aforesaid, I did carefully examine the said Andrew Maxwell, and he did thereupon depose, testify, and say as follows, viz:

I reside at Norwalk, in the State of Ohio. Norwalk is more than one hundred miles from Detroit, Michigan, and I have been a blacksmith for the last twenty-seven years. I am now in the service of the United States, in the Third Ohio Cavalry, duly sworn and mustered into service. I am now in Detroit on a furlough, which will expire on Monday next, December 23. I know Mr. Turrill, one of the plaintiffs; do not know the other plaintiff, Mr. Wormley. I know there is such a rail-

road as the Michigan Southern & Northern Indiana Railroad. In my trade as a blacksmith I have been engaged in the old country and in this country for twelve to fourteen years in the work of mending and repairing railroad-bars. I have lived in this country ten years.

Int. Are you acquainted, or were you ever acquainted with a machine for mending railroad-bars known as Cawood's patent anvil or swage-block? If yea, state where, when, and under what circumstances you became so acquainted, and state fully all your acquaintance with the same.

A. I am acquainted with that machine. I first became acquainted with it at Cleveland, Ohio, some six or seven years ago. I was then working on the Cleveland, Columbus & Cincinnati Railroad. I have been acquainted with those machines since that time up to the present.

Int. Will you describe said machines particularly?

A. These machines of which I speak are worked with rack and lever.

Int. Did you ever see one of those machines in use? If yea, when and where did you first see one in use, by whom, for how long, and how many?

526 A. I have seen those machines in use in Cleveland, Ohio. I first saw one of them used there six or seven years ago. I used it myself, with another man, for the railroad last mentioned by me. I have seen forty or fifty of them in use in all. I have seen these machines in use continuously ever since I saw them first, six or seven years ago. I have seen these machines used on the following railroads: The Cleveland, Columbus & Cincinnati Road, Cleveland & Pittsburgh Road, the Lake Shore Road, Cleveland & Toledo Road, the Chicago, Pittsburgh & Fort Wayne Road, the Michigan Central Road, the Michigan Southern & Northern Indiana Road, the Toledo & Wabash, and on the Illinois Central. Four years ago this last fall I saw two or three of the machines at Laporte, on the Michigan Southern & Northern Indiana Railroad.

Int. How long have you used or worked on these machines?

A. Some six or seven years.

Int. Have you any knowledge or experience of the business of mending railroad-bars without the use of said machines? If yea, state all your knowledge of such business, and your means of knowledge particularly.

A. Before I ever saw that machine I used to mend bars on what we called the common block or anvil. I worked on that about two and a half years in all—a year and a half on the Cleveland, Columbus & Cincinnati Road, and about a year on the Little Miami, Cincinnati & Xenia Road. I worked at that business on a common anvil about three years before I came to this country.

Int. According to your knowledge and experience, state also how many feet can be mended on a common anvil by one forge in a day, and how many men it will require, and the wages of each man, and the aggregate wages of all the hands employed at one forge.

A. From six to eight feet can be mended in a day by that mode. It will require one boss blacksmith and two helpers. I used to have two dollars and twenty-five cents a day as boss blacksmith, and the
527 helpers ten shillings each. The aggregate wages at that rate for the men at one forge would be four dollars and seventy-five cents.

Int. State the cost per foot of mending railroad-bars without the aid of said machine, and all the ways and manners in which they can be so mended without said machine?

A. I think it would cost from fifty to sixty cents a foot. I have not figured it up. The bars cannot be mended in any other way or manner, to my knowledge, except by the use of said machine or the common anvil.

Int. State the cost per foot of mending railroad-bars with the said Cawood patent anvil or swage-block, and also the number of feet which can be mended by one forge in a day, and the number of hands required at each forge, and the wages of each hand; and the wages of all the hands employed or required at each forge in mending rails with said machine?

A. I think the cost per foot of mending railroad-bars in that manner is from twelve to eighteen cents. Twenty-eight feet a day can be mended with the machine. I used to do that much. Three hands are required—a boss blacksmith and two helpers—at the same wages given by me above; eighteen shillings a day for the boss and ten shillings each a day for the helpers, at an aggregate for wages of four dollars and seventy-five cents per day.

Int. Is there any difference in the amount of material required to mend railroad-rails between mending them with and without the use of said machine? If yea, state fully what such difference is, and which requires the most material—state fully.

A. There is a difference. It requires nearly one-third more iron to mend the rails on the common anvil than it does to mend them on said machine. It takes about the same amount of coal in each mode.

Int. State whether railroad-bars can be well and properly mended without the aid of said machine. If not, state and explain why not.

528 A. They cannot be well and properly mended without the aid of the machine, because they cannot be held up so that they can be properly mended. In mending them on the common anvil you are liable to knock the rail down, and in swaging it back to its original height or level you are apt to split the rail in the neck or thin part, and to break off the patch or piece you have already put on.

Int. What number of rails could you repair in a day at one forge with the Cawood machine?

A. When I worked with this machine I have repaired from twelve to eighteen rails a day, according to the number of feet to be mended on each.

Int. How many rails have you mended in twenty-two days with said machine?

(Question objected to as immaterial.)

A. Four hundred and eighty-four rails.

Int. How much actual solid welding have you done in a day on said machine?

(Question objected to by defendant's counsel as irrelevant and answered under objection.)

A. One day thirty-eight feet of solid welding. I was trying what I could do.

Int. How much have you averaged per day for a year with one forge and said machine?

(Question objected to as immaterial.)

A. I would call it twenty-eight feet a day.

Int. How much is the most actual solid welding you have ever done in a day on the common anvil?

(Question objected to as immaterial.)

A. Twelve feet.

Int. What was the average per day for one year on the common anvil?

(Question objected to as immaterial.)

529 A. I should say seven feet.

Int. Have you worked in shops where other parties have been repairing railroad iron on a common anvil?

(Question objected to as immaterial.)

A. Yes, sir; I have.

Int. Did those other parties repair more iron per day on the common anvil than you did?

(Question objected to as immaterial.)

A. They did not.

Int. Do you know a man by the name of William E. Edge?

A. I do know him.

Int. When did you know him, and what was he doing, and how long has he worked for you?

A. I knew him at Pendleton, Ohio, for a short time; then we went to Morrowtown for the same company. He worked for me as helper, mending railroad iron on a common anvil. He worked for me from six to nine months.

(Question and answer objected to as immaterial.)

Int. Do you know a man by the name of Peter Worrall?

A. I do know him. I first knew him in Cincinnati, and afterwards at Covington, Kentucky.

Int. Is there any difference in the principle of the different machines that you have seen, and are they not all for one and the same purpose—to hold a rail in its original position and to preserve it while in process of being repaired?

(Question objected to as leading, incompetent, and as calling for the opinion of the witness on a subject on which he is not shown to be an expert.)

A. They are all on the same principle, and for the same purpose of holding and preserving the rail while being repaired.

Int. How much is the most you have ever repaired on one rail on said machine?

530 (Question objected to as immaterial.)

A. I have repaired fifteen and one-half feet on one rail.

Int. How many feet or inches would be a fair estimate of the amount of work done per rail?

(Question objected to as immaterial.)

A. From eighteen to twenty-four inches would be about the average.

(Signed) ANDREW MAXWELL.

Cross-examination:

Railroad rails cannot be mended properly in any way that I know of, except by the use of said machine.

Int. Do you mean to be understood to say that the machines you saw in Laporte were machines actually made under the Cawood patent, or that they were machines that in your opinion involved the same principle?

A. They were machines involving the same principle.

(Signed) ANDREW MAXWELL.

PETER WORRALL.

Deposition of Peter Worrall, taken on the part and behalf of plaintiffs, on the 26th day of December, A. D. 1861, before Philip A. Hoyne, a United States commissioner for the northern district of Illinois, at Chicago.

And the said Peter Worrall, being of lawful age, and having been by

me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter of controversy aforesaid, did thereupon depose, testify, and say as follows, viz:

1. Int. What is your name, age, and occupation, and where do you reside?

A. My name is Peter Worrall. I am thirty-six years old. I am a blacksmith, and I reside in Geneseo, Henry County, Ill.

531 2. Int. Do you know the parties, plaintiffs and defendant, in the title to these interrogations mentioned, or either, and which of them, and how long have you known him or them fully?

A. I have known Samuel H. Turrill about three weeks and Mr. Wormley about six years. I only know the Michigan Southern & Northern Indiana Railroad Company by reputation.

3. Int. If, in reply to the first interrogatory above, you reply that you are a machinist, state how long you have been engaged in such business or employment; and, if you say, in answer to said first interrogatory, that you are a mechanic, state in what department of mechanics you have been engaged, how long, and when you have been so engaged.

A. I have been working as a blacksmith for twenty-two years—ten years in Manchester, England, three years in Philadelphia, two years in Covington, Kentucky, three years in Marshall, Michigan, and four years in Geneseo, Illinois.

4. Int. Were you ever acquainted with the machine for mending railroad bars known as Cawood's patent anvil or swage-block? If yea, state where, when, and under what circumstances you became so acquainted, and state fully all your acquaintance with the same.

A. I first saw one of Cawood's anvil or swage-blocks in Marshall, Michigan, in the Michigan Central Railroad Company's shop, where I was to work at the time, in December, 1854, and I went to work on one of said swage-blocks a little while afterwards. I worked on said Cawood's block in Marshall, for two years, or thereabouts, in repairing railroad iron. In August, 1857, I worked the same block at Fordham, New York, on the New York & Harlem Railroad, for about three weeks. Since that time I have worked four years in Geneseo, on the Whitcomb or Cleveland block, and Beebe & Smith's block—two years and a half on the former, and one and a half on the latter.

5. Int. If, in reply to the last above interrogatory, you say you are or were acquainted with said Cawood machine, describe the same as fully and particularly as you are able.

532 A. It was a large cast-iron block, weighing from eight hundred to a thousand pounds, with one fast and one movable jaw; the said jaws forming the reverse of the outside of the T-rail, and made to fit the T-rail. It is moved by eccentrics or cams. There are also side-swages on it to fit the T-rail.

6. Int. Did you ever see one of said machines in use? If yea, when and where did you see one of said machines used, and by whom was it used, and for how long a time, to your knowledge? State how many of said machines you have ever seen in use, for how long a time, and by whom, when, and where each machine was used, to your knowledge; state fully all the knowledge you have of the use of said machine.

A. I first saw one of said machines in Marshall, Michigan, operated by Geo. Phillips, in December, 1854. It was in use about one year, by Geo. Phillips, and I used it for two years afterwards myself. There was another in operation at the same shop, for about one year, operated about six months by John Clements, and about the same period by Michael Schiel. I have seen two of said machines at work in Blue Island,

Illinois, operated by J. B. Illingsworth. I have seen two in Joliet, operated by W. B. Illingsworth; one at Bureau Junction, Ill., operated by W. E. Edge, and I operated one for about three weeks on the New York & Harlem R. R., in New York State. In passing through I have seen two of said machines in the Michigan Central Company, in Detroit.

7. Int. Have you any knowledge or experience of the business of mending railroad-bars without the use of said machines? If yea, state fully all your knowledge of said business, and your means of knowledge, particularly.

A. I never repaired rails on a common anvil, but I have seen them welded, at Fordham, on the New York & Harlem Railroad, by a Mr. Clark. I was to work at the shop in which Mr. Clark was at the same time. I also saw them welded in the same manner by Ned Jones, at the Hamilton & Dayton shop, in Cincinnati.

533 8. Int. State the cost of mending railroad-bars per foot without the aid or use of said machine, and all the ways and manner which they can be mended without the aid of said machine according to your knowledge and experience. State also how many feet can be mended by one forge in a day, and how many men will it require and the wages of each man and the aggregate of all the hands employed at one forge.

A. To the best of my knowledge it was costing the Harlem Railroad eighty-five cents per foot without the use of said machine. They were repairing them on a large cast-iron block, weighing about 1,500 pounds. It was called the common anvil with a side swage. I know of no other mode, nor have I heard of any other mode of repairing without the aid or use of said machine, except as above set forth. I measured Mr. Clark's work at the place several times, and never found it to exceed eighty inches in a day, and Mr. Clark had three men to help him in doing such work. Mr. Clark received one dollar and seventy-five cents a day, and the helpers one dollar twenty-five ($1.25) each, making a total of five dollars and fifty cents for the four men to make or repair the eighty inches of rail in a day. I should say that four men in the aggregate could weld about from six to eight feet per day on the common anvil.

9. Int. State the cost per foot of mending railroad-bars with the "Cawood patent anvil swage-block," and also the number of feet that can be mended by one forge in a day and the number of hands required at each forge, and the wages of each hand, and also the aggregate of the wages of all the hands employed or required at one forge in mending rails with said machine.

A. It is costing the Rock Island Railroad Company by contract, with the use of the "Cawood patent anvil swage-block," twenty-six cents per foot or thereabouts. I am working with said railroad company at that price. I can, with three men to help me, turn out, on an average, twenty-four feet per day at one forge.

534 10. Int. Is there any difference in the amount of the material required to mend rails, between mending them with or without the use of said machine? If yea, state fully what such difference is and which requires the most material; state fully.

A. As far as I am able to judge, it takes as much coal in a day on a common anvil as on a "swage-block;" that is to say, it takes as much coal to mend the eight feet or less on the common anvil as it does to mend the twenty-four feet per day on Cawood's patent anvil and swage-block. The amount of iron per foot used will not differ materially between the two modes of mending.

11. Int. State whether railroad-bars can be well and properly mended without the aid of said machine. If not, state and explain why not.

A. I am of the opinion that they cannot be as well or conveniently mended on the common anvil as on the swage-block, for the reason that the peculiar form of the rail renders them liable to crush down or be bent at the neck while in a soft or heated state during the process of welding with the common anvil and necessitating the use of small light hammers of three to five pounds weight; and in using such light hammers the rail is not apt to be so firmly welded. With the Cawood patent anvil and swage-block it is different, because the block holding the rail in its proper position during the process of welding, making us to use hammers of sixteen pounds weight, and makes a firmer and more solid weld, besides working off more at each heat.

12. Int. Are you or were you ever acquainted with a machine for mending railroad bars or rails called and known as "Beebe & Smith's patent swage-block?" If yea, state when and where you first became acquainted with said machine, and how many of said machines you have seen and where they were and in whose possession.

A. I am acquainted with Beebe & Smith's patent swage-block.
535 I first saw one to work at Michigan City in the Michigan Central Railroad Company's shop in October, 1857. I have seen three of them, one in Geneseo, Ill., one in Marshall, Mich., and the one above referred to. I have worked the one at Geneseo for eighteen months.

Int 13. Describe the said Beebe & Smith's patent particularly, and state wherein it resembles and wherein it differs from the said Cawood's patent swage-block, and mention all the points of resemblance and difference in construction, principle, and operation fully.

A. It resembles Cawood in every particular except in the mode of moving the jaws. The two jaws are movable in the Beebe & Smith's patent, and operated by a double-headed lever. They both hold a rail in precisely the same form during the process of welding.

Int. 14. Are you, or were you ever, acquainted with the machine for mending railroad bars or rails called or known as the "Cleveland or Whitcomb swage-block?" If yea, state when and where you became first acquainted with said machine, and how many of said machines you have ever seen, where they were, and in whose possession.

A. I am acquainted with the machine called the "Cleveland or Whitcomb swage-block." I have only seen two of them, both in Geneseo, Illinois. I worked both of them, one for two years and a half. I first saw them in October, 1857. They were in possession or belonged to the Rock Island Railroad Company, and it was at their shop I worked them.

Int. 15. Describe the said Cleveland or Whitcomb machine particularly, and state wherein it resembles and wherein it differs from the said "Cawood patent anvil and swage-block," and mention all the points of resemblance, difference in construction, principle, and operation, fully.

A. It is a large cast-iron block, having one fast and one movable jaw, operated by a rack and pinion. It holds the rail in precisely the same form while welding as the other ones. It differs from Cawood's
536 in the mode of operating the jaw, the principle of the two blocks being the same, differing in construction only.

Int. 16. State whether the different machines you have seen and used are not one and the same in principle—to hold the bar or rail in an upright or original position while in process of being repaired.

A. The principle or main features of the different blocks are the same. They only differ in the mode of moving the jaws.

Int. 17. State whether, in the three ways you have worked these machines, there is any difference in them as to the amount of work you can do per day in each machine.

A. There is no difference either in the amount or quality of the work done on the Cawood, Beebe & Smith, or Cleveland or Whitcomb machine. Workmen generally prefer the one they are most accustomed to. I have no choice.

Int. 18. State the number of feet or inches, on an average, of each railroad bar or rail mended in your shop at Geneseo for the Rock Island Railroad Company.

A. About twenty-four inches, on an average.

Int. 19. State how many bars you average to repair at one forge per day.

A. About twelve.

Int. 20. State how many feet you have ever repaired on one railroad-bar.

A. I have repaired an eighteen-foot rail the whole length, and have frequently put on over one hundred inches.

21. Int. Do you know a blacksmith by the name of Andrew Maxwell? If yea, when and where did you know him, and was he an A No. 1 workman?

A. I was acquainted with Andrew Maxwell in Cincinnati, Ohio, and knew him to be a good workman. This acquaintance commenced with him in 1853. I knew him also to be working in Morrowtown, Ohio, on the Little Miami Road, in mending rails with the common anvil.

And further deponent saith not.

(Signed) PETER WORRAL.

537 Subscribed and sworn to before me the 26th day of December, 1861?

(Signed) PHILIP A. HOYNE,
U. S. Commissioner Northern District of Illinois.

RICHARD COLFORD.

Deposition of Richard Colford, taken on the part and behalf of plaintiffs, on the 5th day of November, A. D. 1864, before Phillip A. Hoyne, United States commissioner for the northern district of Illinois, at Chicago.

And the said witness, Richard Colford, being of lawful age, having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter of controversy aforesaid, did thereupon depose, testify, and say as follows, viz:

My name is Richard Colford. I am forty-three years of age. I reside at Turner Junction, Du Page County, Illinois, and am a blacksmith by occupation. I know the plaintiff Turrill by sight. I saw him for the first time last evening. I don't know Mr. Wormley. I know the defendants by reputation only. I have worked at repairing railroad-iron for the last eight years steady. I have used three different machines for repairing during that time. The first one was the common anvil. I used that nearly two years to the best of my knowledge. The next one I used was a machine operated with a lever, with a rack and pinion, with jaws. That I operated about a year and a half. The last and present one in use by me is called the Cawood patent. I think this machine is stationary—one stationary jaw, and the other jaw movable, and operated by two cams.

On the common anvil, the most work we could do would be seven or eight feet of railroad repair per day. On the Cawood block, we can repair from twenty or twenty-five feet of railroad-iron in a day. I don't think it requires any more coal to the day's work on the Cawood
538 block than it did on the common anvil or block. It requires more iron to mend the rail on the common block than it does on the Cawood block, because there is nothing to keep the rail up in position on the common block. The work is done a great deal the best, and more complete in the Cawood block than that done on the common block or anvil. The work is a great deal smoother and wears better. With the common anvil, a great deal more work came back, the welding being imperfect on the common anvil, and it is a very rare case for the work done on the Cawood block to come back as being imperfectly done. We can use heavier hammers on the Cawood block than on the other, and do better welding and make better jobs. It is easier for me to mend twenty or twenty-five feet on the Cawood block than to mend eight feet on the common anvil. Iron can be mended on the Cawood block when it cannot be done on the common one; in other words, it would require a practical smith to mend iron on the common block when it would not on the Cawood patent.

Rails can be repaired on the Cawood block when they cannot on the common anvil.

In operating the Cawood block, we used two helpers with the blacksmith; the same on the common anvil. I now work at repairing railroad-iron at Turner Junction aforesaid. The rails I mend are T-rails; the same which I have mended on the common anvil, and also on the Cawood block. I have no interest in result of this suit whatever.

(Signed) RICHARD H. his + mark. COLFORD.

Subscribed and sworn to before me this 5th day of November, 1864.

(Signed) PHILIP A. HOYNE,
U. S. Com., N. D. Ill.

JOHN C. RAGLAND.

Deposition of John C. Ragland, taken on the part and behalf of
539 plaintiffs, on the 5th day of May, A. D. 1865, before George P. Bowen, U. S. commissioner for the southern district of Illinois, at Springfield.

And the said John C. Ragland, being of lawful age, and having been by me first duly cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said John C. Ragland, and he did thereupon depose, testify, and say as follows:

My name is John C. Ragland; age, nearly 59 years; occupation, machinist; residence, Springfield, Illinois. I commenced as machinist in 1830. I have worked as a machinist part of the time in Louisville, Kentucky; part of the time in Louisiana, and part of the time in North Alabama, on the Tuscumbia & Decatur Railroad. I have been engaged in mending T railroad-rails on the St. Louis, Alton & Chicago Railroad since 1861, on the block known as the Whitcomb block. (Model shown witness, marked "Exhibit A, E. B. G., notary public.") This model is substantially like the machine and block used by me since 1861, except the size. The size of the machine and block used by me is about twenty inches across the face of the jaws.

The process of mending rails by this machine and block is as follows: The rail is suspended by a crane, and the defective end inserted in a furnace and heated to a red heat; then drawn out of the furnace and placed between the jaws of the block aforesaid, and then scarfed; then inserted in the furnace, and there kept until the welding-heat is produced. A piece of bar-iron of suitable thickness is brought to a welding-heat at the same time; then the rail is placed in the jaws of the block, and the piece of bar-iron is placed upon the rail and welded to it with hammer and sledges—the weight of the sledges being about fourteen pounds. The next process is using the top-swage, and swaging the mended portion to correspond with the balance of the tread, or top of the rail; then the sides of the rail are trimmed of the surplus iron; then the rail is taken out of the jaws of the block, and placed in
540 the side-swage on the block, and smoothed and straightened up with a hand side-swage; then the end of the rail is squared up with a flatter, and that completes the operation.

I use four men; three strikers and one blacksmith or forgeman when using the common belows. When using the blast, we use but two helpers. In using the bellows, the third man is used to blow the bellows. The average number of rails I have repaired a day with the Whitcomb block is from fifteen to eighteen; the average number of feet is from fifteen to twenty-five feet to each fire. I use about ten bushels of coke to each fire, costing twenty-four cents a bushel. I have been paying a dollar and a quarter per day to helpers, and two dollars and seventy-five cents to the blacksmiih. This is about the average wages I have paid since 1861. We use, in repairing T-rails with the Whitcomb block, an average of three pounds and seven-tenths of iron to a foot of mended rail. I have two blocks in use, one block to each fire. I have always used with the Whitcomb block a furnace and bellows. The forgemen I have employed are not practical blacksmiths, but are only competent to mend rails on the Whitcomb block. I have welded from ten to twelve inches at one heat with my furnaces, which are small. If I had larger furnaces, I could weld fifteen to eighteen inches at one heat with the men I have. Quick workmen could weld more. Three of these machines are in use on the line of the Chicago, Alton & St. Louis Railroad, at Chenoa—two in constant use, and one occasionally.

So far as my knowledge extends, the T-rail is the kind most generally in use upon the railroads throughout the country, and this has been the case for the last twenty years. I have seen the V-rail in use on some roads, and on some what is called the continuous rail, which, when laid upon the track, forms the T-rail. The first T-rail I ever saw was in 1833, on the Newcastle & Frenchtown Railroad, between Philadelphia and Baltimore. The T-rail has since come into general use by all railroads. I have never repaired rails on the common anvil-block with side-swages.

541 I don't think they can be as well repaired on the common anvil-block with side-swages as on the Whitcomb block, for the following reasons: In the first place, the rail must be brought to a welding-heat, and when placed upon the common anvil-block and the bar of iron, which is also brought to a welding-heat, placed upon it, in applying blows with the sledge sufficiently heavy to produce the weld, the neck of the rail will be driven down so much as to reduce the rail below the proper height to correspond with the remainder of the rail, and in restoring it to its proper height there is great danger of making the neck of the rail defective. On the other hand, when the rail is repaired in the Whitcomb block, the jaws of the block keeping the rail intact, obviates

the danger of injuring the neck of the rail. In mending the rail upon the common anvil-block, it would be necessary to use light hammers; the consequence would be that the weld would not be substantial, nor could there be as long a weld made successfully as with the Whitcomb block. Not more than six or eight inches could be welded on the common anvil-block at one heat, while on the Whitcomb block from twelve to eighteen inches could be welded at one heat, and in less than half the time it could be done on the common anvil-block; and none but experienced workmen could mend rails at all on the common anvil-block, while men who have learned to heat a rail sufficiently to weld can repair successfully on the Whitcomb, although they could not repair at all on the common anvil-block.

(Signed) JNO. C. RAGLAND.

Subscribed and sworn to before me the 25th day of May, A. D. 1865.

(Signed) GEO. E. BOWEN,
U. S. Com., S. D. Ill.

WILLIAM SHEARD.

Deposition of Wm. Sheard, taken on the part and behalf of plaintiffs on the 6th day of May, A. D. 1865, before Eli B. Goodykoouts, a notary public in Madison County, Indiana.

542 And the said Wm. Sheard, being of lawful age, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter of controversy aforesaid, did thereupon depose, testify, and say as follows, to wit:

My name is William Sheard; age, thirty-five years; reside in Anderson, Madison County, Indiana; am a blacksmith by profession, and am in the employ of the Bellefontaine Railway Company (formerly the Indianapolis, Pittsburgh & Cleveland Railway Company) as foreman in their T-rail repair-shops at Anderson and Union, and have been in their employ since the fall of 1856, at Galions, Bellefontaine, Union, Anderson, and Indianapolis. In 1857 I first commenced repairing railroad-iron with what is called the Cawood block for said company. On the 25th day of March last, at the city of Indianapolis, Indiana, before Edwin A. Davis, U. S. commissioner, at the request of Mr. Whipple, I gave my testimony on behalf of the defendant in a case pending in the United States court for the northern district of Illinois, at Chicago, Illinois, wherein the said Samuel H. Turrill and others were plaintiffs and the Illinois Central Railroad Company was defendant. The model here presented to me of mahogany base and ebony superstructure, with a silver plate fastened on top, having engraved thereon these words: "Joseph D. Cawood; patented September 9, 1856," is substantially like the model which was before me when giving my said deposition, which was marked "Z, E. A. D., U. S. com.," in that deposition as an exhibit. The Cawood machine is designed and used to repair the tread or top surface of T railroad-iron which by use has become fractured or exfoliated. The process of repairing by this machine is as follows: Suppose any portion of the tread of the rail is exfoliated for the space of eight inches or more, which most commonly occurs at the ends or middle. The rail, for convenient handling, is suspended by a crane, and the portion to be repaired is placed into a fire until sufficiently heated; it is then swung around and placed into the jaws of the
543 machine, when the exfoliated are scarfed or cut away until a firm

basis is obtained, upon which is to be welded a piece of iron sufficient to supply the portion thus removed. The rail, together with the piece of iron to be used in supplying the deficiency, are placed into the fire again, and when both are of a welding-heat the rail is again placed into the jaws of the machine, where the piece is welded to the place to be repaired, as above stated. After which a top swage is used to swage the repaired part, to make it conform in shape and size with the residue of the rail. Then a chisel is used to cut away the fins or rough edges on each side of the rail. The rail is then placed into the side-swages of the machine, and a hand side-swage is used for smoothing up the sides of the rail, when it is again placed into the jaws to hold it firm while cutting and squaring the ends takes place. Two heats are generally taken in making one repair, and in long patches sometimes three heats are required. Three men are employed at each fire—a blacksmith and two helpers. A common hand or blacksmith bellows is used at each fire. We pay $2.00 per day to the blacksmith, and $1.70 to each of the helpers. From three to five bushels of coal per day are used to each fire. To repair rails with or on this machine, it does not require a person who has served a regular apprenticeship to the blacksmithing business, but any man of ordinary skill may repair rails after he has acquired knowledge sufficient to know the temperature to which the iron is to be heated for welding, and a person who has served sufficiently long to repair railroad-iron in this machine could not, without an apprenticeship, work at the blacksmithing business. Rails cannot be properly repaired on the common anvil, for the reason that there is no means of supporting the neck of the rail; nor can it be repaired at all where the rail is badly broken or abraded, without the aid of this machine. In my deposition taken at Indianapolis, above referred to, I stated that some three years ago we laid aside the Cawood block or machine. I now say that we substituted the Cleveland block at that time and
544 before, a model of which is before me, marked "Exhibit A, E. B. G., notary public." The face of the jaws of the latter machine is over two feet across. Substantially there is no difference between the blocks or machines—that is, the jaws are identically the same, and perform the same and no different offices—but the manner of operating them is different, and, in my opinion, more convenient on the Cleveland block, which is operated by a rack and pinion. Ever since we laid aside the Cawood block we have continuously used, and still are using, the substituted or Cleveland block. We are using three of the latter at Bellefontaine, two at Union, and two at Anderson. By the Cleveland block, we repair on an average at each fire ten rails per day; we repair from six inches to three feet on each rail; we, on an average, repair from fifteen to twenty feet per day at each fire. In December, 1863, we repaired 165 rails; in January, 1864, we repaired 303; in February, 316; in March, 516; in April, 505; in May, 344; in June, 404; in July, 360; in August, 390; in September, 200; in October, 273; in November, 155. This labor was performed at two fires worked by hand-bellows. This, however, is not a fair test, as to the number of rails that could be repaired in the given time, as the labor of the hands was frequently interrupted by their being employed, at many intervals, in loading and unloading iron and unloading coals, and frequently there were not sufficient rails on hand to keep the workmen constantly employed. The number of hours worked by the hands was ten hours per day.

(Signed) WM. SHEARD.

ALEXANDER SNODGRASS.

Deposition of Alexander Snodgrass, on the part and behalf of plaintiffs, on the 1st day of June, 1865, A. D., before Harlow B. Godard, notary public for Joliet, Will County, State of Illinois.

And the said witness, Alexander Snodgrass, being of lawful age,
545 and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, did thereupon depose, testify, and say as follows, viz:

My name is Alexander Snodgrass. I am about forty years old, and by occupation a machine blacksmith, and reside in Joliet, county of Will and State of Illinois. I first commenced my trade at the age of fifteen years, in Ireland, and served seven years as an apprentice. After coming to this country, I worked about ten years at Rogers' locomotive works, at Patterson, New Jersey. After leaving New Jersey, I worked about two years in Chicago, at the locomotive works of the Illinois Central Railroad Company. Then I went to Springfield, Illinois, and worked on the Great Western Railroad, at locomotive repairs and mending T-rails and making frogs, up to the time of coming to Joliet, and am now and have been since the 15th of last January, A. D., 1865, at work at the shop of the Rock Island Railroad Company, at Joliet, Illinois, mending T railroad-rails and fish-joint rails. I employ four men, myself as foreman, and three helpers. I use an open fire and bellows. The third man is employed in blowing the bellows. I use a machine called J. D. Cawood's patent. It consists of a stationary jaw and a movable jaw, operated by two cams, fastened to a wrought-iron shaft, with a lug at one end of the shaft and a crank on the other end, with a common anvil and side-swages to fit a T-rail next to the stationary jaw. We prepare a rail in the following manner: Place the rail in a crane, with one end in the fire; when heated sufficiently for scarfing, we place the rail in the jaws of the machine, and scarf it, and trim off the loose iron; then we place it in the fire, together with a piece of iron of sufficient size to repair the damaged part of the rail, and when brought to a welding-heat the rail is then placed in the jaws of the machine, and the piece of iron welded to it with hammers and sledges; and then we use a top-swage to form the mended portion of the rail to conform with the balance of the tread; then we cut off the iron used in patching
546 even with the end of the rail, and trim off the surplus iron from the sides of the tread of the rail; then we place the rail in the side-swages on the block and smooth up the sides that have been trimmed off with a side hand-swage; then we square the end of the rail with a flatter.

The hammer I use, weighs two and one-half pounds, and the sledges used by each of the helpers weigh from thirteen to fourteen pounds. We repair from ten to fifteen rails per day, at each fire. The rails to be repaired average about twenty inches to each rail. We use from three hundred to three hundred and fifty pounds of Blossburgh coal per day to each fire. Where we cut off and square up a rail, or upset it and put on but three or four inches, we count that as six inches. But some days we do not have any such to repair, and other days we have three or four rails, and other days but one or two. It requires as much time to heat and weld such rails as it does to repair one of six inches, and that is the reason why we are allowed six inches for doing it. It will take longer to repair fish-joint rails when we cut them off than it does

to weld six inches, because we have to drill new holes in the rail. I have worked on what is known and called the common anvil block, for repairing the T-rail, with side-swages. We used to weld on about one hundred inches per day. We used an open fire and a blast, and two helpers, beside myself. We used much lighter hammers and sledges on that than we do on the Cawood block. We cannot strike as heavy blows on the common anvil-block as upon the Cawood block, for the reason that there is nothing to support and protect the neck of the rail to keep it from crushing down, and the welding could not be done as well. I could not weld the fish-joint rail on the common anvil-block. I am now welding the fish-joint rail successfully on the Cawood block. We used as much coal in putting on one hundred inches with the common block as we do now in welding two hundred and fifty inches with the Cawood block. I can heat and weld and finish up from sixteen to twenty inches at one heat on the Cawood block, and I could not finish up over from five to seven inches at one heat on the common anvil. I have seen men mend rails, in a good, workmanlike manner on the Cawood block, who could not mend the same rail on the common anvil-block at all; and could not do anything at other branches of blacksmithing; and on the Cawood block they could weld as much in a day as I can. We have three of the Cawood blocks in our shop—two in use. I am at work by the day. I get four dollars per day. My helpers get fourteen shillings per day, each. We work ten hours.

(Signed) ALEX. SNODGRASS.

Subscribed and sworn to before me this 1st day of June, A. D. 1865.

[SEAL.] (Signed) H. B. GODARD,
Notary Public.

JEREMIAH DONELLY.

Deposition of Jeremiah Donelly, taken on the part and behalf of plaintiffs, on the 2d of June, A. D. 1865, before J. B. Fitzgerald, a notary public, at Niles, Berrien County, Michigan.

And the witness, Jeremiah Donelly, being of lawful age, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, did thereupon depose, testify, and say as follows, viz:

My name is Jeremiah Donelly; my age is about forty years; I reside in the city of Niles, in the county of Berrien, Michigan; my occupation is T-rail patcher; have worked at the business and had charge of a fire as foreman for the last five years, in the employment of the Michigan Central Railroad Company, at Niles, aforesaid. I first commenced on J. D. Cawood's patent anvil or swage block, made at Marshall, Michigan,
548 which consisted of a stationary jaw and movable jaw, operated by two eccentric cams attached to a wrought-iron shaft, with a lug on one end and a crank on the other. On one end of the block there were side swages to fit the side of a T-rail. I am now using a block operating differently. It opens by a lever and closes by another lever, with a cam on one end and a ball attached on the other, and is substantially like the model now present, marked "Exhibit A, E. B. G., notary public."

The process of mending a railroad rail is, first, to suspend it in a crane, one end of it in the fire and the other on a level with the anvil, and when heated sufficient to scarf, it is then put into the jaws of the block and

scarfed. Then fill up the back end of the scarf to receive the patch. Then take out the rail and put it in the fire with a piece of iron sufficient to mend it. When they are brought to a welding-heat they are placed in the jaws of the machine and the iron is welded to the rail with hammer and sledges. A top swage is then used to swage the mended portion down to correspond with the balance of the tread of the rail; then cut off the piece of iron used for patching even with the end of the rail. Take the rail out of the block and trim off the surplus iron from the sides of the rail, and then place it in the side swages in the end of the block and smooth off the sides of the rail with a side hand-swage; then put it back in the jaws of the block and smooth off a second time with the top swage. In mending T-rails four men are required. I have three men to assist me. I use an open fire and bellows. One man is employed in blowing the bellows. If I had a blast I would need only two helpers. I average about twelve rails a day, sometimes as high as sixteen or eighteen; it depends on the amount of welding to be done. Some days we do not weld more than 240 inches; the average is about 260 inches. I remember putting on 294 inches one day. I use from 350 to 400 pounds of coal per day. I use Blossburg coal. My wages are $1.75 per day. My helpers get $1.50 per day each. The hammer I use weighs nine pounds, and the sledges about fifteen pounds each. I know little or nothing about any kind of blacksmithing, except mending railroad
549 bars. We repair about one-half as many centers as ends of rails. I can weld on and finish up sixteen inches of iron at one heat in the block. We work ten hours a day.

(Signed) JEREMIAH his + mark DONELLY.

Sworn and subscribed before me the 2d day of June, 1865.

(Signed) T. B. FITZGERALD,
Notary Public.

Circuit court of the United States for the eastern district of Michigan.

SAMUEL H. TURRILL AND CHARLES WORMLEY
vs.
THE MICHIGAN SOUTHERN & NORTHERN INDIANA Railroad Company.

I, Addison Mandell, clerk of said court, do hereby certify the above and foregoing to be a true copy of the original depositions of William Sheard, Joshua B. Illingsworth, Maxwell Cornelius, Kinsman A. Huntoon, Alvin A. Stone, Andrew Maxwell, Peter Worrall, Richard Colford, John C. Ragland, Alexander Snodgrass, and Jeremial Donelly, taken on behalf of the plaintiffs in the above-entitled cause, and now on file in my office in Detroit, except the certificates and formal parts thereof, certified by the officers taking the same respectively; that I have carefully compared said copy with such original depositions, and certify the same to be a true copy thereof, and of the whole thereof, except the said more formal parts thereof, and certificates of said officers.

In testimony whereof I have hereunto set my hand and the seal of said court, at Detroit, in said district, this sixteenth day of November, A. D. one thousand eight hundred and seventy-one.

[SEAL.] ADDISON MANDELL, *Clerk.*

550 I consent that these copies of depositions may be filed and used in place of originals destroyed by fire in the cases of Samuel H. Turrill vs. Illinois Central Railroad Company; the Chicago, Burlington & Quincy Railroad Company; the Chicago & Alton Railroad Company, and the Michigan Southern and Northern Indiana Railroad Company, pending in the United States court for the northern district of Illinois.

Chicago, Dec. 14, 1871.

JOHN N. JEWETT,
Solicitor for Defendants in said causes.
R. BIDDLE ROBERTS,
Solicitor for P., Ft. W. & C. R. R. Co.

(Endorsed:) Filed Dec. 16, 1871. Wm. H. Bradley, clerk.

551 *Expert testimony of Hervey Waters and William T. Ragland, taken before Henry W. Bishop, master in chancery, December 19 and 21, 1871.*

SAMUEL H. TURRILL
vs.
THE ILLINOIS CENTRAL RAILROAD COMPANY. } And in other cases, as per stipulation.

TUESDAY, *December* 19, 1871.

Present, the complainant, Walter Curtis, esq., of counsel for complainant, and John N. Jewett, esq., solicitor for respondents.

HARVEY WATERS, a witness produced on behalf of the complainant, being first duly sworn, was examined in chief by Mr. Curtis, as follows:

1. Int. State your name, age, residence, and occupation.

A. Hervey Waters; age, sixty-seven; Boston; occupation, machinist.

2. Int. Have you testified before in this case?

A. I have.

3. Int. State whether or not you have had any practical acquaintance with the welding and working of iron; and, if so, what it has been.

A. I have had practical acquaintance nearly ever since I went to my trade, which I first commenced in a blacksmith's shop, at what is technically called blowing and striking. I have since that time had considerable experience, running through several years, in the manufacture of scythes, without the use of hammers, producing the same from the bar, mostly by the use of rolls.

552 4. Int. Whether or not you are familiar with the machine patented to Joseph D. Cawood, and have carefully examined the letters-patent granted him?

A. I am familiar with that machine, and have examined the patent carefully many times.

5. Int. Whether or not you have ever seen a machine termed the Bain machine; and, if so, when and where you have seen it?

A. I have seen the Bain machine, one on Saturday last, at Elkhart; another on Monday of this week, at Turner's Junction, on the Northwestern Railroad. The one at Elkhart was not in operation; the one at Turner Junction was in operation, and I examined it carefully while standing and also while working.

6. Int. Will you please describe the machines you saw, stating the respective parts of which the machines are composed, their functions, and the methods by which they were combined and operated?

A. In the machine which I saw at Turner's Junction there were at

the end of the two horizontal rolls, or shafts of the rolls, certain rolling dies, for the purpose of working the rail edgeways to correct somewhat the work which had already been done by the rolls working flatwise, and which were analogous to the old swage-block grooves, as represented in the drawing of the Cawood patent at C C. The patent here speaks of them in the manner following:

"Should any imperfection remain, which is not usual if the first operation is properly gone through with, they can be removed by proper hand-swages, after placing the rail in the recesses C C for that purpose." The pantentee then says:

"I do not claim the anvil block nor its recesses," etc., so that all this part of the machines which I saw at Elkhart and Turner's Junction I understand is not in controversy here. There was also attached to the machine, so as to be in convenient contiguity thereto, a saw for squaring off
553 the ends of the rails, which I understand also, has no connection with the subject-matter here in controversy; but there were also in that machine, first, a bottom-roll, lying horizontally, upon which the rail was presented to the machine to weld the patch, and upon which the rail rested, to some extent under the pressure of the upper die roll, while welding on and shaping the patch. There were also between the two horizontal rolls (the upper and lower) two other rolls, having vertical axis, which rested upon the lower roll, and which were brought up firmly upon the perpendicular part of the rail, under its crown, for the purpose of supporting the rail, and not only horizontally but perpendicularly, under the action of the upper roll, while the welding of the patch upon the rail, and the shaping of the rail so patched, was being done. One of these rolls had its journals fixed in permanent relation to the lower roll upon which the rail rested; the other had its journals in a carriage, which carriage was operated by two cams, so that the roll could be brought to or moved away from the rail at the will of the operator; and upon the shaft of these two cams was a lever, or foot-treadle, upon which the operator placed his foot, so as to hold the movable roll firmly up to its work during the operation of welding and shaping the rail. Upon the upper of the two horizontal rolls or shafts was a die for welding the patch upon the rail, and for giving form to the same, working in conjunction with the lower horizontal rolls and the two side rolls for that purpose. A portion of this upper die was cut away or slabbed off, so that a rail could be introduced between the two upper and lower rolls, and between the two side rolls, by so turning the upper roll as to bring the slabbed portion opposite to the lower roll, and so raising the treadle as to carry away one of the side rolls, which was for the more convenient patching of rails when the patch was at some considerable distance from either of the two ends of the rails. The shaft of this upper die-roll had its journals in boxes sliding in the housings of the machine, the boxes being capable of being moved up and down, and being also furnished with weights and levers for the purpose
554 of keeping the die down to its work, and also for the purpose of allowing the upper roll to yield in case the patch was too large, so as to require being drawn down considerably by the action of the rolls, but so as to continue the pressure upon the return movement of the rail and bring the work down to the form required during the return movement.

7. Int. Please examine the model now shown you, marked the "Bain machine," state whether or not it correctly represents the machine you

have thus described, and, if so, point out to the master the repective parts and describe the operation of repairing a rail in that machine.

A. This model correctly represents the machines which I saw, the one at Elkhart, the other at Turner Junction, in all that relates to what is in controversy here, as I understand it; but it differs from those which I saw in the apparatus for swaging off the rail in a manner analogous to what was done with the old swage-block, as I have before stated. But in all that relates to the welding on of the patch, and the shaping of the same with the rail, when in perpendicular position, it is the same. In the use of this machine, power is applied to the lower horizontal roller; this roller being geared to the upper horizontal roller, as is seen in the model; and the power is so applied to the lower roller that it can be driven by the motor of the machine in either direction, or it can be left standing at the will of the operator. In proceeding to patch a rail with this contrivance, when the damaged part is at considerable distance from either end, a piece of iron is prepared and laid over the damaged part before the rail is placed in the furnace to be heated; and, as I saw it used, these pieces were furnished with a provision which should insure that the pieces should not be knocked off by the wind of the furnace or any other slight cause during the operation of taking the welding heat. This was done by turning down ears on the piece of iron upon either side of the rail, just enough to keep it in position, when the rail, with the piece on it, was placed in a fur-
555 nace and brought to a welding-heat. The rail is then drawn out upon a carriage from the furnace, the same carriage being furnished with rollers, so that the rail can be moved endwise upon those rollers easily, and the same carriage is furnished with other rollers or wheels, so that it can work upon a sort of railway, the rails of which lie parallel with the axis of the machine, and at right angles to the line of the rail, so that when the rail is drawn out of the furnace upon the carriage by an endwise movement, it may be easily carried to a line with the working dies or rolls by a sidewise movement. The rolls being in such position that the blank side of the upper die is opposite to the lower roll, and the treadle of the moving side roll being raised and blocked up, the rail is thrust through between the rolls until the part to be mended comes nearly up to the bite of the rolls; the operator then lets down the treadle to move up the side roll, and the rolls are put in motion, so as to draw the rail still further into the machine, when the welding begins at one end of the patch and passes over the rail and patch, and a little beyond the same, the operator having his foot upon the treadle which controls the movable side roller during passing over the patch, as before described. The machine is then reversed in its motion, and the die is then again passed over the work in a converse direction, but otherwise the same as before. These are the only two movements of rail in welding on a patch, as I saw the machine used, but the shaping of the crown of the rail is afterwards perfected by means of the outside rolls, as I have before explained. In welding up and patching the ends of rails, where the exfoliation most frequently occurs, the proceeding is slightly different.

In bringing the rail to the machine, everything is done as before, but in passing the rail into the machine, the work commences as the rail goes in, beginning its work upon the patch at the end of the rail, and proceeding towards the middle of the rail, until the whole patch has been passed over, and a slight distance beyond, when the machine is reversed, and the patch is again gone over, proceeding toward the end of the rail, when the work is completed substantially as before with the exception of the use of the outside rolls.

556 In this operation of welding on a patch as I have described, the bottom of the rail rests upon the middle portion of the bottom roll, the crown of the rail rests upon the side rolls, and the side-rolls rest upon the outer portions of the bottom roll, upon the outside of the rail.

This model is a little shorter in proportion to the working portion of the bottom roll, I believe, than the machines which I saw. In this model the base of the rail is an inch and a quarter wide. The bottom roll is about two inches long—not quite. I mean the working surface. In the machines which I have seen, the bottom roll is about nine inches long upon the working surface, and the rails which were being repaired, and lying about the place, were about four inches wide on their bottoms, so that in the working-machines the working-face of the rolls are in their length a little more than twice the breadth of the rail, and in the model it is considerably less than twice the breadth.

I noticed also that after the rail was brought in front of the machine, and before it was entered between the rolls, a man with a light hammer gave a few blows upon each end of the patch, so as to tack it slightly to the rail under the welding heat, in order, as I understand it, to prevent the displacement of the patch in any way by the action of the rolls before the upper die should be brought to bear fairly upon it.

Adjourned for half an hour.

Int. 8. Please state whether or not, in your judgment, viewed as a working-machine, for the purpose of welding up and re-forming railroad-rails which have become exfoliated, this machine is substantially the same as that you find described in the plaintiff's letters-patent; and, if so, please state in full the reasons which have led you to such conclusions of judgment.

A. I think it is. My reasons for this conclusion are these: This contrivance of Cawood's consists in an "improvement in the common anvil or swage-block," as stated by him in his patent, and I understand that statement to be correct.

557 Now, in repairing rails with the old swage-block, the rail was set upon its bottom upon an anvil, the anvil being the only support which the rail had under the blows of the hammer while welding down the patch and swaging down the top of the rail to give it the proper shape, so that the rail when so mended and shaped was almost certain of being got out of the required form and dimensions, there being no means of securing the proper height of the rail, either from the bottom to the top of the rail, or from the top of the bottom of the rail to the bottom of the top of the rail, the one being necessary in order that the engine and cars may run properly from one rail to the other; the other being necessary in order that the rails may be fished properly, as is most usually done by means of a bar of iron which is made to fit in between the top of the bottom of the rail and the bottom of the top of the rail, all of which had to be done by the old method after the rail was mended, by laying the rail into the grooves of the swage-block, which were such as are represented in the drawing at C C of the Cawood patent.

The rail, after having one side laid therein, being corrected on the other side by the means of what are technically called fullers or swages. In order to enable the workmen to patch the rail and swage it upon its top without essentially disfiguring it, as I have before stated, Cawood made this contrivance, and the contrivance consists substantially in constructing two jaws, each of which contained a groove like C C, with the exception of that part of the groove against which the bottom of the

rail rested while using the fullers or swages, as I have before described, and also a portion of the top rail, and placing these two jaws upon an anvil so as to come up upon the one side of the rail, and assist in supporting the rail upon the anvil so as to take the blows of the hammer while the rail was thus essentially enclosed in a mold. One of these jaws was made solid with the anvil; the other was made upon a slide in connection with the anvil, and furnished with suitable lever and cam,
so that it could be slid upon the anvil, or upon the connections of
558 the anvil, up to the rail, and there firmly held, and so that it
could be slid away from the rail in order to take a rail out of its place upon the anvil, or in order to put it into its place upon the anvil and between the two jaws of the contrivance. When the rail is so placed upon the anvil in this contrivance of Cawood's, the movable jaw brought up against the rail, and the rail brought up to the other jaw, so that it (the rail) shall be held firmly between the jaws, while at the same time the rail sets firmly upon the anvil, the necessary blows for welding the patch and welding up the exfoliated rail may be brought down upon the patch upon the rail with heavy sledge-hammers, so as to weld up solid the exfoliated parts and at the same time weld the patch on to those parts without essentially disfiguring the other portion of the rail, which could not be done by the old method upon the swage-block anvil alone, for two reasons: the first reason being, that the perpendicular part of the rail, when heated, as it is necessary that it should be heated in order to weld on the patch, could not sustain the crown of the rail under the blows of the hammers, without being so changed in its form and dimensions as to essentially destroy the configuration of the rail, necessary when the same is laid into the track in connection with other rails. Another reason is, that the exfoliated parts in the crown of the rail could not be so sustained by the upright part of the rail as that they should become welded to the patch and to each other by the blows of the hammer, but such exfoliated parts can be, and are, sustained in the Cawood contrivance, for both the purposes mentioned, by the jaws of the contrivance, which come up under the cheeks of the rail, and thus support the cheeks, the jaws themselves being supported upon the anvil, the bottom of the rail being also supported upon the anvil, so that the whole rail (with the exception of its top, and a small proportion of the sides of the crown) is supported as it were in a mold, and can take any blows of a hammer which may be applied to it, either for the purpose of welding or shaping the same, without essentially disfiguring
the rail in the parts to which the blows are not applied. This man-
559 ner of supporting the rail constitutes the essential features of
the contrivance of Cawood, as I understand it.

Now, in this Bain machine, as I saw it worked, the lower roller, for the purpose of supporting the rail, is substantially the same as the anvil in the Cawood machine. The side rollers for supporting the rail under its crown are substantially the same as the jaws of the Cawood machine for that purpose. There is also in the Bain machine a contrivance with cams, and a lever for bringing up one of the side rollers, and with it the rail, against the other side roller, so as to gripe the rails firmly between them at that point where pressure is being applied by the upper roller, for the purpose of welding and shaping, as it is applied in the Cawood machine, by a hammer used with a swage, if need be; and this I consider equivalent to the contrivance in the Cawood machine for bringing up the sliding jaw to the rail, and also the rail against the other jaw, so as to gripe the rail firmly there, while the jaws, with the rail, rest upon

the anvil, the same as the side rolls, with the rail, rest upon the lower roller, in the Cawood machine.

The upper roller, with its die, works substantially the same upon the rail in the Bain machine as the swage and die work upon the rail in the Cawood contrivance.

The side rolls in the Bain contrivance, being round instead of being long and straight, as in the Cawood machine, do not support the rail in so great a proportion of its length at one time as they are supported by the jaws in Cawood, but they always support it at that point where the work of the upper roll is being done, the same as the Cawood machine supports the rail at that point where the work is being done by the hammer, and this point is carried from end to end of the repaired portion of the rail, so as to get all over the same (and for the same purpose as the Cawood machine) by the rotation of the rolls.

But the rolls in the Bain machine do not prevent the rails from
560 getting crooked and twisted in the operation of patching as well as the jaws and anvil do in the Cawood machine; but, for all the purposes of supporting the rail at the point where the force is being applied for welding and shaping, the effect is substantially the same.

In order to illustrate my views in regard to this matter, I have had constructed a model of a pair of jaws similar to Cawood's, hinged together at one end, and made to fit the rail upon its sides, as the side rolls fit the rolls in the Bain machine, as represented by the Bain model. And I have here two plain rolls, which were first made to fit up to the rail in the Bain model, so much of the periphery of the rolls being taken away as would amount in the cross-section thereof to a cross-section of the jaws. Now, if these long jaws be put upon the sides of the rail after it is heated, and the machine having in it the rolls with their peripheries removed as I have stated, and the rail with the side jaws be thrust between the side rolls and the top and bottom rolls, the jaws with the rail resting upon the bottom roll and the foot of the operator being held upon the treadle which works the side roll, and the machine put in motion, as I have described in the operation of the Bain machine, the welding and shaping will be done in substantially the same manner as it would be done by the side rolls alone before their peripheries were removed, the only difference being that in consequence of the peripheries of the rolls being made straight, as it is made, instead of being curved as it was upon the rolls, will prevent the crooking and twisting of the rail which takes place in the Bain machine always, more or less; but otherwise the result will be the same. The jaws of the rail will rest upon the lower roll just as they did when the jaws were circular, with the rolls making the periphery of the same, and supporting the rail at the point where the welding and shaping takes place, just as the periphery of the roll supported the rail at that point, the side rolls keeping the jaws up against the rail by means of the treadle, at the point where the work is being performed, just as the periphery of the rolls was kept up to the rail when they were circular, and just at the same points.

561 As a further illustration of my views in regard to this matter, I refer to the model marked "Exhibit A, special, H. W. B." In this model there is a table working upon ways in parallel lines geared in connection with a roller working upon journals in rotary lines. And upon this table is mounted a regular Cawood machine, or what is a representation of the same. And in this model, as will be readily seen, the rail is enclosed between jaws and rests upon an anvil, the whole resting upon the table below and geared to the roller above, upon which

is a shaping die, the same as the shaping die used in the Bain machine, and mounted in the same manner as in the Bain machine, and in the same manner furnished with levers and weights. Now, if a rail with its patch placed upon it be properly heated, and then griped between jaws such as is represented by this model, Exhibit A, special, H. W. B., and suitable motive power be applied to the roller, the rail can be well welded and shaped in the same manner as they are welded and shaped in the Bain machine, and in the same manner as they are welded and shaped in the Cawood machine; the only difference being that the welding and shaping die in such a machine as this Exhibit A would be rotary, and worked by some motive power, while in the Cawood, as described in his patent, the welding and shaping is done with a hammer, worked reciprocally up and down; but for all the purposes of welding and shaping, the one with a roll and the other with a hammer, would be substantially the same in connection with a contrivance below, which is precisely the same as Cawood's, but which is made to move backward and forward under the roller, which is stationary, while in the method prescribed by Cawood the sledge and swage would be carried backward and forward over the rail in the machine, they being stationary.

Now, for all the practical purposes of mending rails, I consider all these contrivances, to which I have referred, to be substantially the same, and mainly because that in all these contrivances the manner of supporting the rail for the purposes set forth in Cawood's patent are substantially the same.

562 Adjourned to 10 o'clock a. m. to-morrow, Wednesday, December 20, 1871.

WEDNESDAY, *Dec.* 20, 1871.

Examination resemed. Present: The complainant; Walter Curtis, esq., of counsel for complainant, and John N. Jewett, esq., solicitor for respondents. Hervey Waters—examination resumed.

Cross-examination by Mr. Jewett:

1. X Int. How long since you commenced the manufacture of scythes in the manner which you stated in your direct examination?

A. I can't answer that correctly; it is something over twenty years since I went about the enterprise.

2. X Int. The machinery employed by you in that manufacturing business was of your own invention, was it not?

A. So much of it as was novel was my own invention.

3. X Int. Will you please describe, briefly, the various processes through which the bar of iron and steel was put in the progress of its manufacture into a scythe, and the machinery used for the purpose?

A. In that manufacture, as finally practiced by me, the first thing was to cut bars of iron into pieces sufficient for four scythes each, and we also cut bars of steel to go with the iron, the steel being usually in three pieces to one of iron. The iron was then heated and beat into the form of a staple around the steel, so as to hold it between the two legs of the staple. This faggot of iron and steel was then heated and fluxed, and passed between welding and drawing rolls, until it was drawn out to about the length of a scythe. The piece was then thinned in its middle, across it, and again doubled up like a staple, but with nothing between the two legs of the staple, and when so doubled up, it was passed between the plating-rolls in the form of a pack of scythes, being two scythes in breadth in each part of the rod, and the two parts of the rod making

two thicknesses, so that the pack thus rolled consisted of four
563 scythe-plates. When this piece came from the rolls, and with the heat then on it, the end where it had been doubled over, or stapled, was cut off so that there would then be two pieces, each containing two scythe-plates, the two plates consisting of two scythe-plates, the one the converse of the other, the scythe-plates being connected by their backs, and these were afterwards slit between their backs, so as to get four scythes from the one pack. This completed the process, as far as the rolling was concerned, and for the purposes of the rolling I used common collar and groove rolls in the welding, but for plating the machines were novel. The machines consisted of two pairs of rolls, each roll of each pair being of that class where a portion of the surface is cut away for the convenience of passing between them, while another portion was full, for the purpose of doing the work. And in plating with these machines, using the rod which I have before described, I made a pass in one pair of the rolls, commencing at the point end of the pack of scythes, and going over so much of the same as the peripheries of the roll would reach over, which was always less than the whole length of the scythe-rod. I then made another pass in the same direction, and to the same extent, upon the partially-plated rod, then changed the rod end for end, and made another pass in the other pair of rolls, beginning at a sufficient distance from the other end of the rod to have stock for the heels of the scythes. These rolls passed off of their work as the other rolls did, and the piece was then rolled ready for four scythes.

4. X Int. By what means, in this process, was the shaping of the plates perfected, and the welding also, between the iron and the steel?

A. The welding between the iron and steel was effected by the rolls entirely, and the shaping of the rod also. So the shaping of the plates was effected by means of the rolls, and the manner of using them, because, by the manner of using them, as I have described, I was enabled to roll scythes of an infinite number of lengths in the same rolls,
564 the lengths of the scythes having been determined beforehand substantially by the amount of the material in the faggot.

5. X Int. In a general way, please state what was the configuration of the working-surfaces of these rolls which you have described.

A. The welding-rolls—collar and groove rolls—such as are in common use for the purpose of rolling flat bars, when it is desirable to have square edges in their general characteristics, but the grooves were so shaped as to roll the rods thicker in the middle than at their two edges, but there was no novelty in these rolls, that I know of; they were common concentric rolls, working in the usual way, one above the other, when the piece was passed through them from end to end, as in common rolling, the rolls having the motion constantly in one direction. But the plating-rolls were different. The working-surface of the plating-rolls were not concentric, but they were eccentric, so as to roll the webs of the scythe-plates thinner toward the point of the scythe than toward the heel. Moreover, there were grooves in these rolls so as to form the points and backs of the scythes, and these grooves were eccentric, so as to make the backs larger toward the heel than toward the point. Moreover, these grooves were in the form of a curve, at and near the point of the scythe, sweeping across or partly across the face of the rolls, so as to produce the necessary form for the point of a scythe.

6. X Int. Did the shafts on which these rolls worked rest horizontally or perpendicularly, when in operation?

A. There were no shafts to these rolls. The rolls were all in one piece and worked horizontally in the usual manner, but running continually

in one direction in the usual manner; in using the plating-rolls, the piece was got into them always at a certain place, which is not done in common rolling.

7. X Int. How was the power applied to these rolls?

A. The welding-rolls were geared in the usual manner for rolling merchant-iron, the motor being applied to the line of the lower rolls, and from that, by means of a pinion power, was applied to
565 the line of the upper rolls. The plating-rolls were geared differently; the motive-power, instead of being applied directly to the rolls, was applied to a driving-shaft, and this driving-shaft was geared to another driving-shaft, in a manner similar to the gearing of the rolls for welding. Upon each of these driving-shafts were two pinions—the two on the lower shaft being for driving the two lower rolls of the plater, and the two upon the upper shaft for driving the two upper rolls of the plater, and upon each of the plating-rolls there was a gear some four times as large as each of these pinions, into which it worked, so as to reduce the motion of the rolls in that proportion. This was for the purpose of keeping the rolls matched in their work more steadily, and also for the purpose of reducing the motion, so that the work could properly be introduced between the rolls.

8. X Int. If I understand you, when the metal came from the plating-rolls the edge, web, and back of the scythe was substantially formed. Is that so?

A. It is pretty near so. The backs were not fully formed until they were cut apart. This I did while they were hot; but after the plates were cold a cut was made with a press around the point of the scythe, and another cut was make upon the whole length of the edge, gauging from the back, so as to get the scythe-plates of their proper width, and also for the purpose of removing the raw edge of the plates and getting back where the steel had its perfect form.

9. X Int. Are you familiar with the processes and machinery employed in the rolling of railroad-bars?

A. I believe so.

10. X Int. Please describe briefly the changes that are made in the bar of iron in the progress of producing a railroad-rail, and the machinery employed for that purpose.

A. I suppose it will be sufficient to begin with the faggot or
566 pile of which the rail is to be formed, because there are various methods of getting the bars of iron for that pile. This pile is sufficient, or something more than sufficient, for a rail, and it consists of bars packed over and above each other, and of the length of from three to four feet, as I remember; perhaps nearer three feet. This pile is placed in a furnace, heated to a welding-heat, and taken out and passed between rollers, the first pass being made with the pile in about the same position as when in the furnace—that is, with the bars over and upon one another. When the bars have become somewhat welded together this faggot or billet, as it is then most usually called, I believe, is turned up ninety degrees, so as to pass it between the rolls in such manner that the perpendicular pressure of the rolls shall be upon the edge of the bars. During this process of welding up, the process of shaping is initiated by bringing the billet into a form narrower upon one side than the other, that part upon which the crown of the rail is to be formed being narrowed up, but the four sides still straight lines from side to side of the billet, as well as from end to end. The definite shaping of the rail is then commenced by passes so shaped as to work down and reduce substantially the thickness of the piece between

the base and the crown of the rail, the rail lying flatwise between the rolls in the passes, which are of the collar and grove character, the base of the rail being against one collar and the crown of the rail against the other collar, as the different passes are made, until it is reduced to the desired form and cross-section, when it is run out upon a carriage and the fag ends are sawed off, leaving the rail the length desired.

11. X Int. How many rolls are made use of in the process?

A. Two; one below and the other above, geared together in the usual manner; that is, there are only two in use at the same time upon the rail. There are usually, I believe, more than two rolls employed in the rolling of a rail from first to last from the faggot, but never more than two at a time; and besides, for the convenience of handling, the
567 mills are built what is technically called three high, there being three rolls and one pair of housings, one above the other, all lying horizontal; but never more than two of them are used at the same time upon the same rail.

12. X Int. In this process is not the welding of the several pieces of which the pile is originally composed accomplished solely by means of the rolls, as well as the final shaping of the rail itself?

A. It is, I believe.

13. X Int. What is the shape of the working surfaces of the rolls through which the rail passes as its completion?

A. It is the shape of a cross-section of the rail.

14. X Int. In your direct examination you have on several occasions spoken of the Cawood machine as not only preserving the form of, but as actually shaping, the rail. As usually operated, does it have any such effect in fact?

A. If you will show me where I have made the statement, I will be obliged to you.

16. X Int. You have described the contrivance of Cawood in the language of his patent, which you say you understand to be correct, as "an improvement in the common anvil or swage block." Does that necessarily involve the existence of an anvil or swage block in the contrivance itself as practically operated?

A. He has so described it in his patent, and I so understand it.

17. X Int. Is there or not represented in the drawings attached to his patent a substantial anvil or swage block upon which the railroad-bar rests or may rest, and upon which the process of reparation of the rail may be accomplished independently of the jaws themselves, as on the swage-block or common anvil?

A. No; I believe not.

568 18. X Int. Is there or not in the machine, as constructed and practically operated, any such anvil or swage block?

A. I believe not. What I mean to say is, that in the machine as constructed by Cawood, and as described in his patent, no anvil is used independent of the jaws. An anvil is used in connection with the jaws.

19. X Int. You have in your last answer, as I understand it, simply described the manner in which the machine is used ordinarily in the mending of a rail. That I did not intend to cover by my question; and I now ask again if there is not represented in the drawings attached to the Cawood patent, and if there is not, in fact, in the working machine, as constructed in accordance with the specifications in the Cawood patent, a substantial anvil-block, which may be used as a common anvil or swage block in the reparation of rails independently of the jaws?

A. And I answer again, I believe not. But the question is extended somewhat from what it was before, inasmuch as it takes in the whole

specification, including the drawings. Upon a somewhat careful examination of the patent, I am unable to discover that there is any contemplated use of an anvil independent of the jaws. The patentee says:

"I usually make my improved anvil and swage block of cast iron, between four and five feet long, and sixteen inches wide across the face, with two forms of recesses, C C, at one end, right and left of a form corresponding with the sides of the rail. Close to these is cast a rail-block, D, nearly as high as the rail, and with its furthest edge also shaped to fit the sides of the rail when it lies across the anvil in its natural position."

Now, the anvil here spoken of is the anvil of the Cawood contrivance, and there is no other that I know of in this contrivance or belonging to it. And he goes on further to say:

"Next this I attach to the face of the anvil, by tongues and grooves, or any other convenient manner, what I call a movable press-block, E, with a similar but reversed-shape edge, lying opposite to the other, so
569 as to enclose the rail between the two, as in the jaws of a vise. This block I work by two eccentric cams, F, on a shaft which is attached to the anvil by two standards, H H," etc.

Further on he says:

"A piece of iron (being of a size suitable the deficiency of the rail) having been prepared and put in the fire, the rail being suspended by its middle to the level of the anvil, is brought to a welding heat, and then swung round from the fire into the space between the two blocks," etc.

Further on in this patent, in speaking of what it does not claim, he says:

"I do not claim the anvil-block nor its recesses."

Now, what I understand the patentee to refer to here is a different thing. There is upon the drawing of this patent two grooves represented in the same piece with the anvil proper of the machine. This portion of that piece he there calls the anvil, but all, or nearly all, of the original anvil proper of the swage-block is not here in the immediate neighborhood of these grooves, but it is under the rail and the jaws, where it should be, the grooves in the drawing being brought as near together as they can be and leave sufficient strength for the purposes of the grooves, without any regard to the purposes of the anvil.

20. X Int. Is the patentee, in your judgment, limited to the particular method of construction described in the specifications?

A. That, as I understand it, is a question of law, which I don't feel competent to answer.

21. X Int. Suppose that in place of casting what the patentee calls the raised block upon, and as a part of what he denominates the anvil, the anvil was cast by itself and the raised block also cast by itself and bolted to the anvil, and the movable press-block was then adjusted precisely as described in the specification, would the machine thus constructed be a Cawood machine?

A. Yes.

570 22. X Int. Before attaching to the anvil thus cast by itself the fixed block and adjusting the movable block, would there not be not only substantially but exactly the old anvil or swage-block?

A. There would not, if I understand the question.

23. X Int. Why not, then?

A. The old swage-block has the two grooves with the anvil, and your hypothetical swage-block, as I understand it, has nothing but the anvil.

24. X Int. We will suppose, then, that we cast the anvil with the recesses as represented by the letters C C in the specifications and drawing; wherein does it then differ from the common anvil or swage-block, and is the difference one of substance, casting what is called the anvil, leaving off what he calls the raised block?

A. The difference here is that the anvil is outside of the grooves, while in the swage-block proper it is between the grooves. This is not a difference in substance, but it is a difference involving great inconvenience in the matter of patching rails by the old process.

25. X Int. Is such an anvil or swage-block as is contemplated in the last preceding question capable of being used for the reparation of rails as a common swage-block?

A. Yes.

26. X Int. Can a machine involving the elements and principles of the Cawood machine be constructed which does not embody in substance, if not in exact form, such an anvil?

A. Yes. The hypothetical anvil of the question, as I understand it, includes the two grooves C C in the drawing of the patent. These are certainly no part of the Cawood contrivance, and he says so in his patent.

27. X Int. Can a machine involving the elements and principles of the Cawood machine be constructed which does not embrace within
571 it the idea of an anvil in fact capable of being used as an anvil and contributing to the combination of the jaws?

A. Yes; in this model of the Beebe & Smith machine there is an anvil for all intents and purposes the same as the anvil in the Cawood contrivance, but it is so connected with the jaws that it cannot be used independently of them.

28. X Int. Suppose you remove from this machine what corresponds in the Cawood form to the movable and fixed jaws, and do you not have in the Beebe & Smith machine substantially the anvil and grooves of which we have been talking?

A. Perhaps yes, but the anvil would be a very poor one, because there would be a seam right through the middle of it.

29. X Int. Is there not, as represented in this model of the Beebe & Smith machine, a substantial anvil outside of the recess in which the jaws rest, which might be used for the purpose of repairing rails as upon a common anvil or swage-block?

A. Yes.

30. X Int. Judging from the language of the specifications of the Cawood patent, what are the uses or functions of what is designated therein as the anvil in the Cawood machine?

A. To assist in supporting the rail while welding on the patch and shaping the top of the rail.

31. X Int. Is that the only use which it has?

A. No. In a machine constructed as described in the patent, what may be called the anvil supports the two jaws as well as the rail.

32. X Int. By what means are these two jaws combined and made to operate in conjunction with each other?

A. By means of the apparatus which slides up the movable block.

33. X Int. Would that apparatus be effective for that purpose without the anvil beneath?

A. To some extent, perhaps, it might, but the machine is much
572 better with the anvil, especially when the machine is organized as it is organized in the Bain machine. I think that in that con-

trivance the machine would be good for very little without the bottom rod, which is the anvil, as there organized.

34. X Int. What means of repairing the rail are contemplated by the Cawood specifications?

A. That, I think, is a question of law, but the means described in his patent for that purpose are mainly the anvil, the two jaws, and the apparatus for working the jaws to and from each other, all being so organized as to support a rail in the manner therein described, for the purposes therein described.

35. X Int. Do the several parts of the machine which you have described in your last answer separately or collectively mend the rail?

A. They do not. It needs the application of a hammer for the purposes of producing pressure upon the patch to weld it to the rail, and also, if need be, to weld up the exfoliated portions of the rail while so held in the Cawood contrivance, or some other equivalent device. In the Bain machine that other equivalent device is the upper die-roller.

36. X Int. Is it not the whole purpose of the Cawood machine to hold the rail and preserve its form while the process of reparation is carried on by other means?

A. No; it is not. It is the purpose of the Cawood machine to hold the rail and preserve its form while the process of reparation is carried on by additional means working in conjunction therewith.

37. X Int. Lay out of the case the contingency of a shattered rail, and supposing the parts that remain to be perfectly sound, and a deficiency of quantity in the crown of the rail to be the only objection to it, and that this deficiency is to be supplied by welding a piece to the top of the rail. In such a case, what use, if any, has the Cawood machine other than to hold the rail and preserve its form during the patching process?

A. I hardly know how to answer that question. I don't now
573 remember ever to have seen such a rail; and whether the Cawood contrivance would assist in the shaping as well as the welding and keeping in form would depend largely upon how much of the rail had somehow gone out of it. If only a little had gone out upon the top, so as not to reach down a considerable depth into the crown of the rail, it would be sufficient for the Cawood machine to support such rail and keep it in form while the patch was welded on it. If considerable of the cap of the rail were gone, so that the patch would have to come down between the jaws to some extent in order to supply the deficiency, then the Cawood machine would not only support such part of the rail as was already in shape, but would serve to form the patch into the required form of rail when so welded on by a hammer or any other equivalent device for pressing down and shaping the top of the patch.

38. X Int. Will you please explain how it is that the Cawood machine assists the mere operation of welding?

A. I will try. When a rail is considerably exfoliated, all the exfoliated parts will be, for a rule, where they should not be, and where they were not originally in relation to the other parts of the rail, and usually they will be carried down nearer the base of the rail by reason of the heavy machines which run over them and heavy freights. When such a rail is heated and placed upon the anvil of the Cawood machine, and the jaws brought up upon it firmly, those exfoliated parts which have been crowded down nearer to the base will be forced upward by the jaws, and those exfoliated parts which have been forced outward by the action of the engines or cars will be forced inward by the jaws, and the exfoliated parts will thus be brought into the position required, and to some extent

welded together by the conjoined action of the two jaws and the anvil, and before the application of the hammer or other external force for the purposes of welding on the patch. When the external force is applied the jaws will sustain the partially welded exfoliated parts while the welding is being completed, and the jaws with the anvil will support the
574 whole while the welding is completed, and while the top of the rail is being shaped by the swage and hammer, or otherwise; and all this is the same as is done in the Bain machine substantially by the side rolls as far as the jaws are concerned, and by the side rolls and bottom roll as far as the anvil and jaws are concerned, and by the side rolls, and bottom roll, and top roll, with its die, as far as the anvil, and jaws, and hammer, and swage are concerned, in using the Cawood contrivance.

39. X Int. Take what you say is the unseen case of a rail with which the only difficulty is a deficiency of metal in the crown, whether produced by unknown causes or by cutting away of the exfoliated parts, and this deficiency is to be supplied by welding a piece of iron to the top of the rail. How does the Cawood machine assist the mere operation of welding on the patch in such a case?

A. That question I have already answered to the best of my ability, as I understand it.

40. X Int. In your description of the Bain machine, if I understood you, you stated in substance that the side rolls rested upon the bottom roll. Is this bearing such as to produce any considerable amount of friction, and are they not designed to run entirely clear from each other?

A. This bearing does produce considerable friction, as is evinced by the machine itself, where the marks of the side roll upon the bottom roll are very plain upon the machine as I saw it used at Turner's Junction, and it appears to me to have been the design of the constructor that they should so rest. The journals of the side rolls appear to me to be quite insufficient for the purpose of supporting the rolls under the pressure which they receive in a downward direction, and, besides, if it was intended that the side rolls should rest upon their own journals, I don't see why the bottom roll should have been nine (9) inches long when half of that length would have been more than sufficient to support the rail.

41. X Int. Do you regard it as essential to the successful working of the Bain machine that the side rolls should thus bear upon the bottom roll?

575 A. I do as the machine is constructed. Perhaps it might be constructed so as to support the side rolls upon their own journals, but I hardly see how; indeed, I don't now see how it could be done at all, because there is very little room between the two horizontal rolls, or the rolls which have their axis horizontal, for the introduction of the side rolls, which have their axis perpendicular. It would be much easier to support the stationary side roll upon its journals than the movable side roll, the movable side roll being hung in a carriage which slides upon the cross-girts of the housings, and only kept there by two bolts or more, which do not hold the piece firmly down to the cross-girts, but only serve for imperfect guides to the carriage which carries the roll. Now, any considerable pressure brought to bear perpendicularly upon this side roll would force it down so as to cock this carriage so that it could not be slid upon the bolts, if it did not carry it away altogether, provided the support furnished by the bottom roll were taken away. If, however, the machine were so constructed so as to take the necessary pressure from the side rolls without their coming in contact with

the bottom rolls, I should regard it as substantially the same machine, provided it worked otherwise as it now works.

X Int. 42. In the working machine what is the length of these side rolls?

A. I don't now recollect, but the length, as well as I remember, is equal to the height of the rail to be repaired in them, measuring from the bottom of the rail to the crown of the rail and perhaps a little upward upon the crown, which may be, perhaps, in the working machine about four (4) inches or a little less.

X Int. 43. Is it necessary to the working of the machine that these side rolls should revolve?

A. Yes.

X Int. 44. Will you state why, Mr. Waters?

576 A. It is because it is necessary for the rail to move along between the upper and lower roll, in order to get over all the work to be done from end to end of the patch and a little beyond, and if the side roll did not revolve, the rail in moving along would have had to slide between them; which, I think, would not do; but if it would do, the rail would be mended just as well, although the side rolls might be worn out much oftener than would be profitable.

X Int. 45. Is there, in your judgment, sufficient pressure of the side rolls against the rail in this machine to enable them to contribute much assistance toward the feeding in of the rail?

A. I think there is pressure enough upon the rolls to enable them to do that, but they can't so contribute without there is some driving power applied the side rolls. But there is some driving power applied to the side rolls in the Bain machine, as I saw it, by means of the pressure of the side rolls upon the bottom rolls. If the machine were constructed so as to have no pressure of the side rolls upon the bottom rolls, and otherwise constructed as it now is, the side rolls could contribute nothing to the moving along of the rail, but the rail would be moved along by the top and bottom rolls, and it, the rail, would move the side rolls.

X Int. 46. Suppose you take away from the Bain machine the top roll, its gearing, and supports, would you or not have left a practical machine for the mending of rails?

A. You would not.

Redirect examination:

1. Int. Suppose you take away from the Bain machine the top rod with its gearings, would it be possible to repair a rail in the machine you would then have left?

A. Not unless you substituted something to perform the functions of the top roll. If the top roll were taken away, and a sledge-man with the sledge-hammer and swage were employed, rails might be repaired in it after the manner in which they are repaired in the Cawood machine proper, but it would be an inferior machine for the purposes of repairing rails practically.

577 2. Int. Suppose the rolls in the Bain machine were gauged for the purpose, would it be possible to roll in that machine the pile as it comes from the furnace in the operation you have described of rolling rails?

A. No. It is impossible to roll down railroad-rails by the use of four rolls having all their axes substantially in the same plane as they are in the Bain machine. Two rolls are all that can be used practically at the same time, and upon the same point in the rail in rolling railroad-rails as they are now rolled.

3. Int. Take away from the Bain machine the side rolls, would the remainder of that machine differ substantially from the old swage-block with its hammer applied by the workmen or not?

A. It would not. The upper and lower roll would work together substantially as the old anvil and sledge work together in the use of the old swage-block, and it would encounter the same difficulties that existed in the use of that old contrivance.

4. Int. If I understand you correctly, then, if you were to remove the upper roll and two side rolls, you would have nothing left but an anvil. Am I right?

A. Yes, and the anvil would not be a very good one. It would do very well to draw iron upon, as I know from my own experience, and have sometimes used a roll for that very purpose.

Recross examination:

1. X Int. You never used such an anvil for the purpose of patching a rail, did you?

A. No, I never did; nor any other anvil, except such as is embodied in Cawood's contrivance. I did once make some experiments, or had some made under my discretion, in the use of that machine.

HERVEY WATERS.

Adjourned to Thursday, December 21, 1871, at 10 o'clock a. m.

578 THURSDAY, *December* 21, 1871.

Pursuant to adjournment. Present, the complainant, Walter Curtis, esq., of counsel for complainant; John N. Jewett, esq., solicitor for respondents.

WILLIAM T. RAGLAND.

William T. Ragland, a witness produced in behalf of the complainant, being first duly sworn, was examined in chief by Mr. Curtis, as follows:

1. Int. Please state your name, age, residence, and occupation.

A. William T. Ragland; age, fifty-six; Bloomington, Illinois; practical engineer and machinist.

2. Int. In your occupation as a machinist have you had any experience in the welding up and repairing of railroad-rails? If so, please state for how long a period, and what your experience has been.

A. I have had experience in repairing railroad-rails for about eight years consecutively up to the year 1865; since that time, until within the last three (3) months, I have been employed in assisting in the construction and building of railroads, laying iron, bridging, etc. The last three months, and at the present time, I am engaged in the repairing of railroad bars or rails.

3. Int. Are you familiar with what is known as the Cawood machine; if so, for how long a time have you been acquainted with it, and where have you seen it in operation, or used it?

A. I am acquainted with the Cawood machine and its operations, used in repairing T rails since the fall of 1853. I have seen it in operation upon various railroads, and am using it at the present time in repairing T rails.

579 4. Int. Are you acquainted with the Bain machine, of which the model is before you? If so, please state upon what railroad you have seen it in use, and at what points on those roads; whether or not you have made a careful examination of in construction and modes of operation.

A. I am acquainted with the machine known as the Bain machine, now exhibited here; am also acquainted with its mode of construction in all its details. I have seen it in operation on what is known at the present time as the Lake Shore & Michigan Southern Railroad, at a station called Elkhart. I have also seen it in operation on the Illinois Central Line in their shop at Amboy. I have also seen it in operation at Turner Junction, in the shops of the Northwestern Railroad Company. I have also seen it in operation on the line of the Chicago, Alton & St. Louis Railroad, at their shops in the town of Bloomington.

5. Int. Did you make the measurements for and construct the model of the machine in this case?

A. I made the measurements of the machine at Turner Junction; made a sketch-drawing of it and superintended the construction of the model. This model exhibited here is the one I speak of, and is a correct representation of the machine at Turner Junction at the time I made the measurements and drawings.

6. Int. How does the machine at Turner Junction compare with the machines upon the other roads which you have just testified you have seen? Are they all substantially the same or not?

A. They are all substantially the same machine.

7. Int. Regarded as working-machines designed to weld up and reform railroad-rails which have become exfoliated or shattered, are these machines, in your judgment, substantially the same in their construction and mode of operation as the Cawood machine? If so, please state the reasons you have for so considering them.

(Objected to by Mr. Jewett.)

580 A. They are substantially the same, in my judgment. Now, the reasons I have for coming to that conclusion—as being substantially the same machine as the Cawood machine—is that I find in the Cawood machine an anvil-block with one stationary jaw mounted thereon, having its outer edge made to conform to the side of the rail to be operated on. Opposite to that (the jaw) and on parallel lines with it, I find another jaw, that is movable, made for the purpose, and set on the anvil-block so that it can be moved up and grasp the rail firmly on each side, the jaws so grasping it coming up to a line of about the center of the crown of the rail, with its base resting upon the anvil-block, and held in that position firmly during the operation of welding on the patch on the crown of the rail, thereby preserving the former configuration of the rail that may have been got out of shape by the heating and handling before being put in the machine. These jaws also act, in their operations, upon the side of the rail—that where exfoliated parts of the rail have been driven down below the centre line of the crown of the rail by the constant rolling and passage of wheels over it; when it, (the rail so exfoliated and driven down, as before mentioned,) after being placed in the furnace and being brought to a welding-heat, and placed in the jaws by the action of the jaw being brought against the sides, the parts so driven down are brought up to their original height and position on the side of the crown of the rail, and partially welded thereto; thereby bringing the rail to its former shape at that point, and presenting an even surface for laying on the patch. I find in the Bain machine four rollers; two of them lying and being driven horizontally—two rollers having their vertical shafts at right angles to the horizontal lines of the two other rollers before mentioned.

This bottom roll I find a raised surface on the centre of it from seven (7) to nine (9) inches in width, the side rolls having their shafts vertical, having the side or flat surface of them resting on this raised surface

on the bottom roll. I find the top roll lying horizontally, with a grooved roll on the centre of it, which groove is constructed to conform to
581 the crown of the rail. I find the two side rolls, their outer peripheries being fitted to the side of the rail, thereby conforming to its configuration. Now, in the Bain machine, when the rail is taken out of the furnace, with the patch thereon, at a welding-heat, it is immediately placed between these two side rolls and the upper and lower rolls; one of the side rolls is moved by the action of a lever and cam, so that by the operation of the man in charge, at the moment the rail is placed between these apertures I have mentioned before, the side roll is brought up firmly against the side of the rail, thereby holding it firmly between the two rollers, having their outer peripheries to fit the configuration of the sides of the rail. The rolls then are set in motion, and by the pressure of the top roll, or swage, the patch is brought down and welded firmly to the crown of the rail. At the return action of the rail, when the motion of the rolls are reversed, the patch is finished on the crown of the rail.

The upper surface of these side rolls coming up about to the center of the crown of the rail, thereby preserving all that shape of the rail, from the top of the base to the under side of the crown, and about to the center of the crown. I find that these parts of the Bain machine, as I have described them—that the bottom roll, with its raised surface in the centre, is the anvil on which the base of the rail rests as in the Cawood machine. I find the side rolls in which the rail is grasped firmly to hold it in its original position during the time it was operated on by the swage in the top roll, as it is in the Cawood machine during the time in which the patch is operated upon by the process of swaging on the patch, as performed with a swage or sledge-hammer.

I find the top roll having its configuration of groove to fit the top or crown of the rail to a line of about the centre of the crown, as in the Cawood machine, top swage used for the same purpose.

From all these facts before stated, I come to the conclusion,
582 after a careful examination, that the Bain machine is substantially the same as in the Cawood machine, as used for repairing railroad-bars.

8. Int. State whether or not, in the operation of the Bain machine, the rails after being presented to the action of the rolls as you have described are completely repaired, or whether they require additional manipulation before they are fitted in their configuration for use upon the roads.

A. They are not so finished. After the patch is welded upon the surface by the action of the rolls before mentioned in the Bain machine, they are passed between two side swage-rolls, having their configuration to fit the crown and that part of the neck of the rail between the top of the base and the top of the crown. That operation in rolling is for the purpose of finishing the side of the crown of the rail which is left in an unfinished condition by the before-mentioned process of welding on the patch, there being a quantity of iron known as the fin forced out immediately between the edge of the top swage and the face of the side roll. This side-rolling process is for the purpose of rolling that down smooth, presenting a surface like the rest of the rail which has not been heated.

9. Int. How is it with the rail which has been presented to the action of the swage in the Cawood machine in this respect?

A. There is also upon the rails when acted upon by the Cawood machine, after swaging down upon the top with the top swage and shaping

the crown of the rail and the configuration of that part of the rail which has not been heated. There is also a fin, or portion of iron that is forced out from under the swage, which is afterward trimmed off with a chisel. The rail is then placed in the Cawood machine in the swage or grooves immediately alongside the jaws, and swaged down with a swage and sledge-hammer; the swage conforming that part of the crown of the rail that is of the same configuration of the part of the rail that is operated upon, thereby making a complete finish of that part of the rail which has been patched.

10 Int. Are you familiar with the process of rolling railroad-rails?

583 A. I am.

11. Int. State, if you please, how it is carried on as you have seen it.

A. The piles or bars of a sufficient quantity in weight, the number usually four pieces, from three and a half to four feet in length, are placed in a furnace, brought to a welding-heat, and then placed between the rolls. When they pass through the rolls the welding is performed. They are then passed back again through another pair of rolls or in some instances the same pair, thereby reducing them in size and elongating them. They are then passed through another groove in the rolls, which groove is a rough outline of a T-rail. In that passage through the rolls they are brought to what will be the determined height of the rails and nearly the size of the crown, neck and base of the rails. They are then passed through the finishing pass and their ends sawed off and squared, which finishes the process of making a railroad-bar. They are then taken and placed upon a level structure for that purpose, covered with iron plates and curved in a sufficient arc, the crown of the rail being the outside of the arc, and left there to cool.

12. Int. How many rolls are used and in what relative position are they placed?

A. There are two rollers; one at the bottom is driven by the motor, the other, the top roll, immediately with the center perpendicular over the center of the bottom roll, and driven by a pinion geared into the end of the bottom roll, which also has a pinion on it. In some instances that I have seen of the process, there are two pairs of rolls standing, but not connected with each other; the second pair having a reversed motion by which the operator can pick up the bar that has passed through the first pair of rollers, throw it into the second pair, having a reversed motion from the first pair, thereby landing it, the iron, after passing through the rolls on the same side of the first pair of rolls in which it has passed through. That process is

584 such that the iron can be passed through backward and forward, and shortens the time of making the bar, saving the labor of passing it back to the side it commenced on at the first beginning of the rolling.

13. Int. When it is desired to reroll rails which have been in use and have become shattered, what method is pursued?

A. The old bars, when they are taken to the rolling-mill, are cut into pieces with a pair of shears, the pieces being three and a half or four feet long, or about that. A sufficient number of these pieces are held together by a band and placed in the furnace and brought to a welding-heat. They are then placed in the rolls, passed through in the same manner as before described. In some instances, in the rerolling of old rails, where there is a contract for that purpose with the parties so getting them rolled, the old rails are welded together after being cut in short pieces and formed into plates, five to six inches wide, three and a

half or four feet long. The plates are then piled a sufficient number of them to make the rail with the plate on the bottom and one on the top of new iron made from the ore, and in some instances steel. After it is all so piled they are then put in the furnace, brought to a welding-heat, and passed through the rolls in the same manner as before described.

14. Int. Would it be possible to carry on the process of rolling or re-rolling in the Bain machine?

A. It would not.

15. Int. For what reason, sir?

A. Several reasons might be named here why. I will give a brief one —that you can't finish a rail in that, because of the fin which would be formed on the outside of the center of the crown; further, because there is no provision made in the machine for reducing the pile from its original size when coming from the furnace, so that it could be entered into this Bain machine. In fact, no rail can be passed through
585 the Bain machine except it be a rail that has already been finished and conforms in its structure so as to fit the side rolls and the top swage.

16. Int. Suppose the top roll or swage, as you have termed it, were removed from the Bain machine, would it, in your judgment, be possible to carry on the process of repairing exfoliated rails in that machine by the aid of a sledge and swage or not?

A. It would.

17. Int. Please describe how you would do it.

A. After all the top roll and its supports were moved away—the side rolls remaining as they are—the rail may be placed in between those side rolls, as in the Cawood machine—between its jaws—the one side roll being brought up firmly against it by the cams. The operator, by using the swage on a center line with the axis of the side rolls, with a helper to feed the rails between each blow, it would mend a rail in that machine more successfully and with greater facility than it could on the common swage and anvil block; though it would not be what I would consider, in my judgment, a practicable machine to be used for that purpose. But as regards the supports of the rail on the sides, it would be equally as well supported, if properly fed between the blows of the sledge-hammer, as it is in the Cawood machine.

18. Int. What form of machine is in use where you are now employed, in repairing rails?

A. We are using one machine similar in its construction to the Beebe & Smith machine. That machine is an old machine, which was in the possession of the road before I went there, which I consider a very inferior machine. The other machines are some I had made for that purpose, substantially the Cawood machine, but having no grooves on what is known as the anvil-block, being a groove on the jaw immediately beside the edge which clamps the rail, so that the rail may be turned
586 immediately after being lifted out of the jaw; the movable jaw is then closed, the rail laid on its side, the side of the crown resting in the groove on the top of the jaw; the lower side of the flange of the rail laying in the aperture between the two jaws. Those are the only two machines which are in use where I am at work.

19. Int. As a practical mechanic, are you able to estimate approximately the cost of erecting one of these Bain machines, together with the necessary appliances for operating the same?

A. Well, I should have to get at that as a sort of rough estimate, not knowing the weight, etc. I should judge that the whole machinery,

including the stationary engine, which is necessary to drive it, furnaces, cranes, rollers, carriages for carrying the iron, hydraulic presses for punching and straightening the railroad-bars after they are mended, probably in the neighborhood of from twenty to twenty-five thousand dollars.

20. Int. Please answer the same question in reference to the Cawood machine.

A. The Cawood machine, complete and ready for operation, from forty to seventy-five dollars. They vary in their price according to weight.

Cross-examination by Mr. Jewett:

1. X Int. Why could not a rail be mended in the Bain machine, the top roll being removed, without the use of the swage?

A. It could be done without the use of the swage, and be hammered on with swages and hammer, and brought nearly to the shape of the other part of the rail, but it would not be in a workmanlike manner, nor present as smooth a surface for the wheels to pass over.

2. X Int. Why could it not be done well and properly without the use of a swage, as in the Cawood machine?

587 A. That question is rather ambiguous, and I hardly comprehend it. It can't be done in the Cawood machine without a swage, in a workmanlike manner.

3. X Int. What would be the effect upon the rail which is being patched by hand, between the side rolls of the Bain machine, of a blow from the sledge either side of the line of the axis of the two rollers?

A. It would curve the rail in proportion to the weight of the blow.

4. X Int. What is the length of the Bain machine, in a line with the axis of the side rolls?

A. If my memory serve me right, I think it was about five feet. It might be a fraction over or under from the extreme outsides of the frame.

5. X Int. How far from the point of support between the side rolls would the operator stand to weld on a patch with a sledge?

A. The operator with the sledge would get within about eighteen inches of the point to which he delivered his blow. His position would be in front of it.

6. X Int. Would it be practicable, in mending rails in that way, always to strike the blow in the exact point supported by the side rolls, as rails are usually mended?

A. It would, and require no more practice than is now used on the Cawood machine with a common swage.

7. X Int. How much of the rail would be actually supported by the side rolls at any one time?

A. From an inch and a half to two inches. The outer extremes of the inch and a half or two inches would not be supported as firmly as that part in the immediate line of the axis of the center of the side rolls, but would be supported sufficiently to keep the rail from being driven down to any extent below its original height, or causing the rail to curve.

8. X Int. All of these rolls are supposed to be round, are they not?

588 A. They are round.

9. X Int. How much of bottom support is there for the rail at any one time on the lower roll?

A. About the same amount as there is on the sides in proportion to

the diameter of the bottom roll and the side rolls, and the support would be as described in the side rolls.

10. X Int. Can you, as a matter of mechanics, make a straight line touch a round surface at anything more than a single point?

A. No, sir.

W. T. RAGLAND.

589 TESTIMONY FOR DEFENDANTS.

Deposition of Edward Greenleaf, taken de bene esse before a commissioner preparatory to the trial at Chicago, in 1867.

Depositions of witnesses taken in an action pending in the circuit court of the United States for the northern district of Illinois, wherein Samuel H. Turrill et al. are plaintiffs and the Illinois Central Railroad Company is defendant, for the defendant, at the time and place hereinafter mentioned, the plaintiffs being represented by Samuel H. Turrill in person, and the defendants by S. M. Whipple, its attorney.

EDWARD GREENLEAF, of the county of Marion, State of Indiana, of lawful age, being first duly sworn by me as hereinafter certified, deposes as follows:

591 My name is Edward Greenleaf. I reside in Marion County, State of Indiana. I am nearly sixty-three years of age. I am a machinist and builder of steam-engines. I have lived at or near Indianapolis since 1851 or 1852. Before coming to Indianapolis I worked six months at Madison, Indiana. Immediately previous to going to Madison, I worked about two years for Anthony Harkness of Cincinnati, Ohio, building tools for him the first year. Among other tools I made what I called a "clamp-anvil" for Mr. Harkness. It originated under the following circumstances: Mr. Harkness had undertaken to build iron frame locomotives. Mr. Hellenbacker, Mr. Harkness' forger, failed in attempting to make the frames on a common anvil, on account of the impossibility of keeping the angle-iron in shape, there being no clamp to hold it. Mr. Harkness, proprietor of the concern, then came to me to see if I could not devise some means of making the forging successful. I told him I thought I could, and he directed me to go ahead and do it. I then went to work, planned and constructed a machine like that represented by model marked "X, E. A. D., U. S. commissioner." According to the best of my recollection, the machine was sixteen inches wide by two feet long; the model referred to is on a scale of three inches to the foot. Angle iron was made in the machine as follows: A slab of iron five or six feet long, six inches wide, and one inch thick, (represented in thickness and breadth by model marked "V, E. A. D.,") and a piece of the same length, two inches square, (represented by model marked "U, E. A. D.,") were clamped together at one end by a pair of heavy tongs, and the other ends placed in the fire till they had attained a welding heat, when they were welded together on a common anvil, after which the other end was welded in the same manner.

592 This process left the two pieces welded together at the ends. The pieces thus attached were then put into a furnace and brought to a welding-heat, when they were taken out and placed on the anvil, (X, E. A. D., U. S. commissioner;) thus the work is rapidly run under the hammer while in the position above indicated, and the welding partially completed. The pieces are then turned into the clamp-anvil X thus, and the welding nearly completed under the hammer. The piece

is then reheated and completed by placing first the wide and then the narrow edge in the clamps at the ends of the anvil and drawing them out under the hammer. The positions are thus. The result is the perfect angle-iron represented by model marked "W, E. A. D." The piece W, when finished would be from seven to eight feet in length. To make a locomotive frame, it is necessary to weld several of these pieces together at the ends, in order to get the requisite length of frame. This was accomplished as follows: Two pieces were taken to another fire, and scarfed or beveled at the ends on a common anvil to prepare them for welding. The pieces were then put in the furnace, subjected to a welding-heat, and welded by being placed on the clamp-anvil X, turned from one side to the other and welded under a trip-hammer weighing from four to five hundred pounds. This operation is repeated till the requisite length of frame is obtained, which at that time was
593 twenty-three feet, as made by Harkness at his shop. The peculiar office of the machine or clamp-anvil X is to hold one limb of the angle-iron and preserve it in shape while the other is being hammered. I worked for Mr. Harkness about a year and a half after making this invention. During this time my clamp-anvil X was in constant use for the purpose for which it was constructed. Mr. Hellenbacker continued to be Mr. Harkness' forger, and used the anvil during my stay with Mr. Harkness.

Q. 1. Witness, as an expert, is presented by attorney for defendant with a model marked "Y, E. A. D., U. S. commissioner," and is asked what it represents.

A. The model represents a clamp-anvil like mine, marked "X," except it was made for the purpose of holding a T-rail instead of angle-iron rail. The principle or mode of operation is the same.

(The question and answer objected to by plaintiff.)

Q. 2. In your opinion, could railroad-rails be successfully repaired in clamp anvil Y?

A. In my opinion they can be so repaired.

(Question and answer objected to by plaintiff.)

Q. 3. Witness is now presented with model marked "Z, E. A. D., U. S. commissioner," and is asked what it represents.

A. It represents a clamp-anvil similar to mine; the principle is the same, but the machine is more complicated; both are operated by eccentrics; mine by one Z, by two ÷; angle-iron could be made on Z by changing the forms of the jaws of the clamps.

(Question and answer objected to by plaintiff.)

Q. 4 Witness is now presented with models X, Y, and Z, respectively, and is asked, are they the same in principle and mode of operation.

594 A. I should say they were. The principle of operation is the same, but in different form.

(Question and answer objected to by plaintiff.)

Q. 5. In your opinion, as an expert, would it require the exercise of inventive skill to modify anvil-block X into anvil-block Y; or anvil-block X into anvil-block Z?

A. In my judgment, I should think not.

(Question and answer objected to by plaintiff.)

Cross-examination by plaintiff:

Q. 1. Does not the eccentric in model X have to be moved so as to let the angle-iron slide on the anvil while being hammered, at each blow?

A. The hammer strikes in one place, and the eccentric has to be moved every time the iron is moved.

Q. 2. Did you ever repair any railroad-rails?

A. I never did.

Q. 3. Did you ever see a machine or model like Y, E. A. D., U. S. commissioner, before this was presented to you?

A. I never saw a model or machine like it before.

Q. 4. Can you take your machine, as constructed by you, and used in manufacture of angle-iron, and mend railroad-rails?

A. With very little alteration in the jaws only.

Q. 5. Can you without any alteration, as arranged and constructed for the purpose of manufacturing angle iron?

A. No, sir; not without changing the jaws.

595 Q. 6. Was your machine, as constructed, considered by you and others using it as a great improvement over the then known methods of forming angle-iron?

A. Yes, it was considered the best machine for that purpose that had ever been made, by me and other men of judgment who used it.

Q. 7. Was it considered of great value in the manufacture of angle-iron?

A. I think it was. I consider it a great misfortune to myself that I did not patent it.

Q. 8. Did you not make a deposition once before, in June, 1862, in a suit by the same parties against the Michigan Southern and Northern Indiana Railroad Company, involving the same model as herein presented, marked "X, E. A. D., U. S. commissioner?"

A. I did; but the model then used was a larger one than the one marked "X," but of the same machine.

Direct examination resumed:

Q In your opinion, as an expert and an inventor, do you think it requires the exercise of inventive skill to modify clamp anvil X into clamp-anvil Z?

A. I should think not.

(Question and answer objected to by plaintiff.)

EDWARD GREENLEAF.

WILLIAM SHEARD, of lawful age, being first duly sworn as hereinafter certified, deposes as follows:

My name is William Sheard; my age is thirty-five years; I reside at Anderson, Madison County, Indiana; I am a blacksmith, and foreman of the rail-shops at Anderson and Union, on the Bellefontaine Railway Company's line, and am in the employ of that company,

596 and have been so employed by that company since the fall of 1856, at Gallion, Bellefontaine, Union, Indianapolis, and Anderson. I first began to repair rails on that road in the summer of 1857, at Bellefontaine, under the following circumstances: While at work in the shop at Bellefontaine, in 1857, a man came there, I think from Michigan, with a block for repairing T-rails. The block was substantially like the one represented by model marked "Z, E. A. D., U. S. commissioner." The jaws were the same. They were worked in the same manner, by two eccentrics, worked by a crank at one end and by a lug to be struck by a sledge on the other, to keep the movable jaw to the rail. The length of the jaws were from fifteen to twenty inches. I should judge the model Z to be one-fourth the size of that used by me. The man who brought it to the shop set it up, and went to work with it

to show me how to operate it. The company finally adopted it, and set me at work with it. I soon after discarded the crank and lug, and substituted a lever about three feet long, with a heavy cast-iron ball on the end. The other arrangement failed to keep the movable jaw in its place when the rail was being hammered upon. A damaged rail is repaired as follows: Tilter T, E. A. D. represents a T-rail, and S, E. A. D. a piece of iron prepared for welding upon T. The said T is prepared by being heated and upset, as seen on top of model T, after which T and S are heated to a welding-heat; T is put into clamp-block Z and S, placed upon rail T in a proper position, when they are welded by hammers and sledges, after which we have what is called a top swedge for giving the form to the mended portion of the rail, so as to make it conform to the remaining part of the tread of the rail. The jaws are then opened and the rail trimmed off with a chisel; the fins or shavings on the sides of the welded parts are what is trimmed off. The rail is then taken out
597 of the jaws and put into the side swedges on the end of the block, for the purpose of smoothing up the sides. The rail is usually heated but twice in the operation, once for scarfing and once for welding and finishing up in the block.

In heating I used a fan-blast on an open fire, and had two helpers to assist in the work already described. In using the block we patched a rail anywhere from four inches to four feet in length. The usual amount put on was from six to nine inches on each end of the rail, and from six to twenty-two inches on the whole rail, including ends and flanges. No use was made of the jaws in welding flanges. About one third of the work consisted of welding flanges. I have an account of the number of rails repaired by me for eleven days in September, 1860, and find that it was fifty-five rails. During ten days in the succeeding October I repaired thirty-six (36) rails. During ten (10) days in November, 1860, fifty-one bars. In December, 1860, ten days, sixty bars. In January, 1861, in twenty-one days, repaired one hundred and sixty-six rails. The average would be from three to ten rails each day, and the amount of welding from eight to twelve feet each day. Sometimes it might have been as high as fifteen feet per day. We discontinued the use of the anvil-block Z about three years ago. We used two on the Bellefontaine Railway, one at Indianapolis, the other at Bellefontaine. The block formerly used at Indianapolis is now in my shop at Anderson, but not in use.

WM. SHEARD.

UNITED STATES OF AMERICA,
State and District of Indiana, ss:

I, Edwin A. Davis, a United States commissioner, duly appointed by the circuit court of the United States of America, for the district
598 of Indiana, in the eighth circuit, to take acknowledgments of bail and affidavits, and also to take depositions of witnesses in civil causes pending in the courts of the United States, pursuant to the acts of Congress in that behalf, do hereby certify that Edward Greenleaf and William Sheard, the above-named deponents, were by me first sworn to tell the truth, the whole truth, and nothing but the truth in the cause now pending in the circuit court of the United States for the northern district of Illinois, wherein Samuel H. Turrill and others are plaintiffs, and the Illinois Central Railroad Company is defendant; that the foregoing depositions were all written by me, and that said deponents severally subscribed their respective depositions, after the same had been

carefully read over to them by me; and that the plaintiffs were represented, during the taking of said depositions, by S. H. Turrill in person, and the defendant by S. M. Whipple, its attorney; that all informalities relative to time, notice, or form of taking said depositions were waived by the said Turrill and Whipple. The said depositions were all taken at my office, in the city of Indianapolis, State and district of Indiana, on the 23d day of March, 1865, between the hours of ten o'clock a. m. and five oclock, p. m. on said day, agreeably in all respects to the agreements of the attorneys of the parties.

In witness whereof I hereunto set my hand and seal this 23d day of March, A. D. 1865.

EDWIN A. DAVIS, [L. S.]
United States Commissioner.

Fees, $10, paid by defendants.

(Indorsed:) Opened March 30, 1865, for defendants' attorney. Wm. H. Bradley, clerk.

599 NORTHERN DISTRICT OF ILLINOIS, *ss:*

I, William H. Bradley, clerk of the circuit court of the United States for said northern district of Illinois, do hereby certify the above and foregoing to be a true and correct copy of the depositions of Edward Greenleaf and William Sheard, taken and filed in said court in the cause wherein Samuel H. Turrill et al. are the plaintiffs and the Illinois Central Railroad Company is defendant, as appear from the original depositions now on file in said court now remaining in my custody and control.

In testimony whereof I have hereunto set my hand and affixed the seal of said court, at my office, in Chicago, in said district, this fourteenth day of October, A. D. 1869.

[L. S.] WM. H. BRADLEY,
Clerk.

[5-cent stamp, canceled.]

Testimony of Edward Greenleaf, taken in open court at the trial in Chicago in 1867.

EDWARD GREENLEAF, witness for defendant, being duly sworn, was examined in chief by Mr. Cozzens, and testifies as follows:

Q. Where do you reside?
A. I reside in Indianapolis, sir.
Q. What is your business?
A. I am a machinist and steam-engineer.
Q. Did you ever make angle-irons for locomotive-frames?
A. Only in one instance.
Q. Where was that?
A. In Cincinnati.
600 Q. How long ago?
A. In the year 1849, as near as I can recollect.
Q. How did you make them? What kind of machines, if any, did you use in making them? Please describe to the court how you made them.

A. The difficulty was that we couldn't make the pieces we wanted without putting them in such a shape, (indicating.) We couldn't do it without new machinery. The proprietors asked me whether I could make this thing straight. I told them I thought I could. They told me

to show me how to operate it. The company finally adopted it, and set me at work with it. I soon after discarded the crank and lug, and substituted a lever about three feet long, with a heavy cast-iron ball on the end. The other arrangement failed to keep the movable jaw in its place when the rail was being hammered upon. A damaged rail is repaired as follows: Tilter T, E. A. D. represents a T-rail, and S, E. A. D. a piece of iron prepared for welding upon T. The said T is prepared by being heated and upset, as seen on top of model T, after which T and S are heated to a welding-heat; T is put into clamp-block Z and S, placed upon rail T in a proper position, when they are welded by hammers and sledges, after which we have what is called a top swedge for giving the form to the mended portion of the rail, so as to make it conform to the remaining part of the tread of the rail. The jaws are then opened and the rail trimmed off with a chisel; the fins or shavings on the sides of the welded parts are what is trimmed off. The rail is then taken out
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EDWIN A. DAVIS, [L. S.]
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In testimony whereof I have hereunto set my hand and affixed the seal of said court, at my office, in Chicago, in said district, this fourteenth day of October, A. D. 1869.

[L. S.] WM. H. BRADLEY,
Clerk.

[5-cent stamp, canceled.]

Testimony of Edward Greenleaf, taken in open court at the trial in Chicago in 1867.

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Q. Where do you reside?
A. I reside in Indianapolis, sir.
Q. What is your business?
A. I am a machinist and steam-engineer.
Q. Did you ever make angle-irons for locomotive-frames?
A. Only in one instance.
Q. Where was that?
A. In Cincinnati.
600 Q. How long ago?
A. In the year 1849, as near as I can recollect.
Q. How did you make them? What kind of machines, if any, did you use in making them? Please describe to the court how you made them.
A. The difficulty was that we couldn't make the pieces we wanted without putting them in such a shape, (indicating.) We couldn't do it without new machinery. The proprietors asked me whether I could make this thing straight. I told them I thought I could. They told me

they thought it was worth making the experiment, and told me to try it. It was made formerly in this manner. The difficulty in making this piece in this shape was that the common hammer formed it into the section of a circle. It couldn't be got back without spoiling the face when it was under the hammer, in this way. Without these clamps it would make it in this shape, (indicating.) The question was whether I could make something that would keep it straight while it was hammered, by making this clamp-handle that could hold it perfectly straight, and not get crooked in the making. In the other way we couldn't make the piece of six or seven feet without making it three or four inches crooked. This done away with all the difficulty in this respect. The way we formed it was this: We took two inch bars of iron, and what is called a , of six or seven inches, perhaps an inch thick. We stuck it in the fire, then put it into the furnace. That was done in a common blacksmith's fire. After that we put on the hammer in this way. A man stood there, (indicating,) and another one there, (indicating,) and held it, when the hammer came down on it. A man would relieve it; that was the reason why it was moved. This piece was put on after the second heat was taken, and operated in this way, (indicating.) The next heat would
601 affect it in that way (indicating) and work it on that side; at the same time this narrow angle in there was shifted, and worked at the first heat until it was well headed, and then another light heat was taken of it. Then it was run through and straightened up nicely, and made smooth, and we found the piece came out perfectly straight over here at this edge, all of one thickness in this machine. In the other it would hammer this edge out, and draw this out longer in every instance, and make a section of a circle of it. We found that to make that piece perfectly straight there was no other way of doing it but this. The process was this: We took this piece and set it on there, (indicating.) We then welded it all the way along the foot of this anvil. In a short time after that was done we slipped it into the other side, and brought out that piece on the hammer while it was worked. The hammer let go of it every time the hammer rested. Then we turned it over and worked on this part. When that was done this piece that came out was about two or three feet longer than when it was first put into the machine. After that was completed, then this piece was some six or seven feet and sometimes longer—depends upon the length of the first piece. It was then taken upon a common file and scarfed and beveled, then put into a common blacksmith's fire and brought out in this way. One man held it up there, (indicating,) and one heat made this edge. Then it was run through the hammer both ways, and so on till we got the length we wanted, which was some twenty feet. We found a great difficulty in making that rail there without this machine. We couldn't make the piece at all in the first place without using up three or four tons of iron in making it, but there never was a piece lost that I know of after this machine was made.

602 Q. Is this angle-iron about the size of the actual angle-iron?

A. Yes, sir. This is larger when it comes out of the furnace. When it is finished it is about two-thirds of the thickness when it comes out of the furnace.

Q. Is it about as wide in this model as it is when it goes into the machine?

A. Yes, sir. And the width is brought down a little narrower.

Q. Is this width here—the widest part—about the same in this model as it was in the actual angle-iron when it first went into the machine?

A. Yes, sir. This is about the size of it, but when it comes out it is about 4½ inches wide here, and about 3½ here.

Q. What was the benefit, in regard to this angle-iron, which you derived from welding them in this machine?

A. You couldn't make it in the other. The difficulty was this, that it made a crooked piece of it, and by holding it with these clamps you could work it straight.

Q. I am speaking now about welding the end of them together.

A. They could not do it half as well in a common fire as in this.

Q. What was the reason that enabled you to do it so much better in this?

A. This holding it up to keep it straight while the welding is made. It holds it and keeps it in shape. That is, the whole principle of the machine was to keep the bar in straight while we were working it.

Q. About how long did you use that machine for making angle-iron?

A. I stayed there about a year and a half, and from that time they have used it all the time.

Q. It was working, I suppose, when you left it?

603 A. Yes, sir. I never knew it to fail. I never heard any complaint about it. I was in another branch of the business, but I heard it worked well all the time.

Q. What is all this portion made of?

A. Cast iron.

Q. All the jaw?

A. Yes, sir; everything cast iron except the handles.

Cross-examination by Mr. Stoughton:

Q. Mr. Greenleaf, you remember being summoned to Detroit as a witness, don't you?

A. Yes, sir.

Q. Will you get me those pieces there, the two, (indicating.) Now, your purpose was to make angle-iron for locomotive-frames; one of the pieces out of which you were to form it was something like that, about two inches square?

A. Yes, sir.

Q. And about six or seven feet long as you used it?

A. No, sir; not so long as that.

Q. How long?

A. Some five or six feet; there is a particular length picked out; five feet was the average length.

Q. You took another piece for the wider side of the angle-iron, about like this which I hold in my hand?

A. Something like this.

Q. You in the first place welded this together slightly at each end?

A. Yes, sir; in a common fire.

604 Q. Then you again put them into the fire to get them to a welding-heat, and heated them altogether?

A. Yes, sir.

Q. And after you got those two pieces welded together, you had a square corner there, (indicating,) and your purpose was to reduce that in thickness and this in size, and get a round fillet inside, was it not?

A. Yes, sir; that was taken into consideration. A fillet was required there, but that would not do. The great difficulty was that it made these fillets too large.

Q. Now, you tried to do this with a common anvil, didn't you?

A. Yes, sir.

Q. On a common anvil?

A. No, sir; not on a common anvil.

Q. On what kind of an anvil?

A. I have a steam-hammer and a flat anvil, but a square corner like that.

Q. And whenever you undertook to make a fillet on that your piece would crowd it off, would it not?

A. Yes, sir; crowd off the anvil. That was the difficulty.

Q. You wanted to make a fillet?

A. Well, we took that into consideration with the rest of the machinery. We didn't care particularly about that. That was considered an improvement in it. It was all fillet before.

Q. See if you can refresh your recollection a little. On your former examination I asked you to show what you meant by fillet. I mean that round part in the corner. That is it, is it? (Handing witness paper.)

A. Yes, sir; that is a fillet.

605 Q. You remember that was it, don't you?

A. Which?

Q. That the fillet you referred to was that round piece in the corner?

A. Yes, sir.

Q. Then I put to you this question: "Q. Is there anything in the machine which formed it, that round part, in the corner?—A. Yes, sir; that was the difficulty at first; the round corner." You could not make it, could you, on a common anvil?

A. No, sir.

Q. You tried, didn't you, some three weeks?

A. The difficulty was this, we made it all fillet.

Q. You could not make the fillet you wanted?

A. We could not get it small enough. Here was the difficulty; it came right off there to the edge; it made too much fillet.

Q. Did you want a fillet?

A. We wanted a fillet, but we wanted it small.

Q. And you wanted the fillet to strengthen the iron, didn't you?

A. Yes, sir.

Q. Then I put to you this question: "Q. Were those corners like the machine that was used there?—A. No, sir. I made round corners the first time I made it. We could not make round corners without clamps, but we made sharp corners." Do you remember that?

A. I know we could not.

Q. I put to you this question; put your mind to it if you please:

606 "Were those corners like the machine that was used there?—A. No, sir. I made round corners the first time that I made it."

A. Yes, sir. I made round corners on the anvil the first time.

Q. You made round corners with the machine?

A. Yes, sir.

Q. "We could not make round corners without a clamp, but we could make a sharp corner without it." Do you remember that?

A. No, sir; I don't. I can't remember that.

Q. Well, we'll go a little further.

Cross-examination.—"Q. I understand you to say that that model was not like the machine because of this sharp corner; it would not make a fillet?—A. Yes, sir; I said so." "And the fillet was indispensable to the making of good iron?—A. Yes, sir; yes, sir. The shape of the iron required it to give it strength." Was that so?

A. That was so, but the question with me was to make this square corner, if we could not make it any other way.

Q. Do you remember the fact that the fillet was indispensable?

A. I can't say now, it is so long since.

Q. Wasn't it necessary, in your judgment, that there should be a fillet for the purpose of strengthening this iron?

A. I should never have been called on to make this machine if we could have made these pieces square.

607 Q. Wasn't it necessary, in your judgment, that there should be a fillet for strengthening this iron?

A. Not altogether.

Q. Was it considered necessary?

A. I took it in this way: that it was considered an improvement in the machine.

Q. "I understand you to say that to make an angle-iron by a machine just like that you would make it good for nothing—it would not be good enough for the purpose; it would not be a good article." Do you remember swearing to that?

A. No, sir; I don't remember that fact.

Q. Would it be a corner with square corners without a fillet?

A. No, sir; it would not be so good.

Q. That is not what I asked you. Now we'll go a little further: "Q. If this piece that was put into these jaws, one piece having been welded to another, as we described this corner, instead of being filleted was square—I speak of the old method by the anvil.—A. Yes, sir." I was then showing you jaws having a square corner, and not like that rounded off.

A. When this is welded.

Q. You don't understand me. If you were to leave that corner square, and put this piece in and clamp it up, you would get no fillet, would you?

A. None at all.

Q. You would leave a square corner there just as it is now?

A. Yes, sir.

608 Q. That was not what you wanted, was it?

A. No, sir.

Q. "And the great object to give it a filleted corner, was it?—A. Yes, sir." Do you remember that?

A. It is so long ago since, I can't remember positively.

Q. Wasn't that the object?

A. My memory is treacherous. I can't remember at my age so far back as that. I will state to you my honest opinion what I made the machine for.

Q. I have no doubt about that, but I want to get your recollection. Was there anything you wished to say?

A. Yes, sir. I wished to say this: I don't think there was anything said by the proprietors about that fillet. When the first order was made for these machines I considered it an improvement.

Q. We'll go a little further: "Q. So you didn't put it in here—that is, into the clamps?—A. We put it in to make a square outside and a fillet inside." Is that so?

A. Yes, sir; that is so.

Q. Now, sir, we'll proceed to the operation of this machine. After you had got this piece—this narrow piece—welded, as you say you did, on the top of that anvil—the wide piece—your object was, among other things, to make this fit it in the corner?

A. Yes; that was taken into consideration in the first place.

Q. The object of that machine was to do it, wasn't it?

A. Yes, sir.

609 Q. You say you would have been contented with a square corner in the first place?

A. I know the proprietors would; I don't know that I should.

Q. Let us look at that. Suppose you were contented with the square corner, how much did you reduce the thickness on that piece before you got it to the size you wanted it—that two-inch piece?

A. I should have reduced it to half an inch.

Q. How much did you in practice?

A. From two inches down to three-fourths.

Q. How much did you reduce the thickness of this?

A. $\frac{5}{16}$ or a little more perhaps.

Q. How much longer did you make this?

A. It sometimes came out two feet long, sometimes less and sometimes more.

Q. So when this was completed, the piece which was an inch thick when you started had been reduced to what thickness?

A. Between $\frac{5}{8}$ and $\frac{3}{4}$.

Q. And the piece which was two inches square has been brought down to what thickness?

A. $\frac{5}{8}$.

Q. Now, sir, if you were contented with the square corner without the fillet here, didn't you take those two pieces of the size you had reduced them to by hammering and weld them together and make angle-iron?

A. It was tried.

610 Q. This is my question: You bring the iron down—that is, the widest pieces—to $\frac{3}{4}$ or $\frac{5}{8}$, as the case may be. That was the thickness you wanted it?

A. Yes, sir.

Q. You bring this down to $\frac{3}{4}$ of an inch in thickness; that is the thickness you want it?

A. Yes, sir.

Q. Why didn't you take a piece $\frac{3}{4}$ of an inch thick and two inches wide, and the other widest piece, and weld the two together on the anvil if you didn't want to fit it?

A. This comes down wider than the two-inch piece. This two-inch piece came down from that to within half an inch of this; that is the reason; for two thin pieces could not be put together if part of this iron was over there where it was straight.

Q. I know it, because you made a fillet of it. It was so, wasn't it?

A. Yes, sir. This sinks into the thick piece.

Q. Why; because you are all the time hammering away first upon this piece and then upon the other?

A. No, sir; it settled down into that that way.

Q. You welded it together first?

A. Yes, sir.

Q. You didn't settle it down into it without welding it?

A. Yes, sir; pretty near half way through the bar.

Q. Suppose you had taken the piece $\frac{7}{8}$ of an inch thick and hammered it on there?

A. It would all have been burnt up before it would have been welded.

611 Q. And you had to take the thick piece?

A. Yes, sir.

Q. And you pounded it down until you reduced this piece to an inch, and you had reduced this about ⅝?

A. Yes, sir; and the square bar was sunk down pretty near half through it, and when this is on the anvil and in shape this is brought down and lapped away over here, and this is welded on to part of it on the inside.

Q. Did you say that two pieces would not answer?

A. Not as you would have welded them.

Q. Now we'll go to the operation of this machine. You welded the two pieces together?

A. Yes, sir.

Q. Were your two recesses for letting the pieces down of the same depth, or one deeper than the other?

A. They were just like this, but they were so arranged that neither piece went down into the recess.

Q. They were not to touch the bottom?

A. Yes, sir.

Q. That was not considered indispensable?

A. No, sir.

Q. Every blow that you struck was a blow that made this wider and longer, was it not?

A. Yes, sir.

Q. And every blow you struck here was a blow which made this thinner and wider and longer?

A. Yes, sir.

Q. So that every blow you struck upon this after it was welded
612 changed its figure within these jaws—that is, I mean the piece within the jaws—longer and wider?

A. It made the pieces on top of the anvil longer. Of course, this must be the effect of it.

Q. Then it changed the figure of the pieces as to the length and width that was between the jaws, every time you struck it?

A. Yes, sir. As I said before, all the object of the clamp was to keep it straight.

Q. But another object of the clamp was to enable you, by the relation of these pieces, to enable you to make every blow tell, and make the piece above wider and longer at every blow that was struck—that is so, is it not—until you got it down?

A. Why, of course, it could not be otherwise, as this piece came out some two feet longer, and every blow helped.

Q. Every blow changed the figure of the piece that was between the jaws?

A. Yes, sir.

Q. And your hammering was done upon that?

A. The hammering was done upon that altogether; that is, upon the iron.

Q. This part under the piece was never touched?

A. No, sir; that was never touched, but afterwards turned over thus and hammered wider than these pieces.

Q. Of course; because sometimes you worked this hammer upon this piece there upon that side and this, upon this piece, on this side, and the face was extending in width, in fact could come over the face of the whole piece?

613 A. Yes, sir; it came over the side.

Q. With a square corner you would have no fillet there, would you?

A. No, sir; it would soon wear off.

Q. I am supposing a square corner, and made round together with a fillet?

A. Yes, sir.

Q. Now, Mr. Greenleaf, it was a great while ago that you worked this machine?

A. Too long for a man to tell just all about it. It is between sixteen and seventeen years since I made it. But I was within a dozen yards of it for two years and a half.

Q. Do you remember as to the thickness of these pieces?

A. No, sir; I can't say that I could do that, but they were made sufficiently strong that they didn't break.

Q. They were made strong enough to hold your piece between them?

A. Yes, sir.

Q. And that was all you remember of that?

A. The old anvil was just about this size.

Q. But as to the thickness you don't remember?

A. No, sir.

Q. Whether they were ¾ of an inch, an inch and a half, or two inches you don't remember?

A. I don't think they would have been an inch and a half or more than ¾. I don't remember now; I think they were, but I don't suppose that anything was out of proportion.

614 Redirect examination:

Q. I want to ask you two questions, Mr. Greenleaf, in respect to the rounding off of the corners here. Does this model correctly represent the actual machine?

A. It represents the old one, except not so much corner.

Q. It has a smaller corner than this one?

A. Yes, sir. Otherwise it looks just like it.

Q. You say the old machine; how long was that used?

A. I can't tell; it was used for a year and a half to my certain knowledge.

Q. You stated, in answer to a question by Mr. Stoughton, that this part, the anvil part, was about the same size, about as near as you can recollect, as the Cawood machine. Will you state whether the whole model including the jaws were used—the actual size of the old machine?

A. It looks just like it except these corners.

The testimony of Edward Greenleaf, at the trial in Detroit, as follows:

I reside at Indianapolis when at home. I am a civil engineer and an engine-maker; I have been some forty years. I was employed as a machinist at Cincinnati by one Harkness. I think I went with him in 1847 or 1848. I was there two years. His business was building locomotives, steamboat-engines, and all kind of machinery, cotton-machinery, mill-work, and heavy forging. He used angle-iron. There was difficulty in forging angle-iron at first. They worked at it some two or three weeks, but could not make it. They first tried to make it
615 after I had been there about a year, I think. (A model shown to the witness, marked .) This is not a very fair representation of the piece. The difficulty of making it on a common anvil was that it made the narrow edge thin and thick at the bottom, which caused it to hug around in the form of a circle, so that when it lay on

the ground it would be raised at each end, and then straightening would spoil it, so that we found that we could not make it on a common anvil. By a common anvil I mean the heavy cast-iron anvil—a heavy block, something like two feet square. This difficulty was overcome by making the machine to hold it with what we call a clamp. This model is a fair representation of the machine. We took a slab six inches wide, and from five to seven feet long and one inch thick. Then we took a two-inch bar and put it on in that form, (indicating,) and introduced that into the fire, and first headed it a little and weld' it at the end, and then turned it around and did the same thing with the other end. Then we put it into the clamp and welded it the whole length. When that is ready a man is placed here at one of the handles and another there at the other handle, and a hammer weighing three or four hundred pounds is brought to bear upon it, and the piece is brought back and forth, the hammer working very quick until it is welded. While this is being done the man throws up the clamp to catch it, and moves the bar along and catches it again. It is carried on three or four times until it is brought down nearly to its size, which is, when finished, about one inch or seven-eighths of an inch, the man operating the clamps every time it is struck. It is clamped right every time it is struck with the hammer, six or eight inches in width, until it has all passed through, when it is thrown out.

616 The model shown represents a piece of angle-iron, except that the ends are ragged and unfinished; that is carried into the fire and finished; the ends are then squared up.

If the jaws were not clamped up, the application of the hammer would be apt to part them. This machine was finished and put into use in the shops not later than 1849. I am not positive of it. It removed entirely the difficulty in making angle-iron. They had no difficulty afterwards. I know it was used for a year while I was there, and after that I couldn't tell, because I was not there. I never have known of anything used anywhere else, not up to that time nor since then, until I heard of this railroad-clamp. The effect of hammering upon the inside of the wide rim is that it kept its width within a quarter of an inch; and as to the narrow rim, it brought it from a two-inch square bar to two and a half inches wide and seven-eighths of an inch thick, leaving a fillet in the corner. By fillet I mean the round part in the corner. The machine formed a fillet. That was the difficulty at first. The round corner was what throwed it off on the common anvil. They could not do it, and then they got the clamp. The middle part, the corner being taken off, was what formed the fillet. When we tried the common square anvil I couldn't work it well enough; we couldn't form this fillet. It makes a two-inch weld where there is only seven-eighths of an inch piece put on. The hammer made the outside wider by a quarter of an inch. It made the inside something like one and a quarter inches wider, leaving seven-eighths. Here would be one and a quarter as the effect of the hammering. The effect of the machine with these movable jaws was to remedy the difficulty we had at first, which was to prevent this piece from flying off from the anvil whenever the hammer came down. Whenever the hammer came down it would work the edge out. These clamps left that part there almost the same shape as

617 when put in, until it was brought up here and worked a little on the anvil, to bring it down to what we wanted. There was nothing to keep the movable jaws down to the anvil block, if I recollect right. Their own weight kept them down. Nothing was needed to keep them down. The machine worked successfully so far as I know. It was said by every one who saw it that it did. We had no alteration

to make in it. It was working when I left there. I got up that machine myself. The corners in the model now shown me are not like those in the machine. I made round corners the first time that I made it. We couldn't make round corners without a clamp, but we could make the short corners without. Angle-iron with a sharp corner would not answer the purpose we wanted.

Cross-examination:

The model shown was not like the machine because of these sharp corners. It would not make a fillet, and a fillet was indispensable to make good iron. The shape of the iron required it to give it strength. The machine was one solid block. Angle-iron made upon a block like the model would not be good enough for that purpose; it would not be a good article. We could have made angle-iron with a sharp corner upon a common square anvil, but not for that purpose. It required a clamp to hold it to the round corner to form the fillet. This machine was made to make a fillet and to make the general thing. We commenced making it on a common square anvil, but we could not get a round corner. The fillet is a part of the two-inch piece. In working that machine the workman would bring that clamp up tight, and would then cause a blow of the hammer to fall upon it and then move it along and another blow would be struck. The hammer weighed four
618 hundred pounds. It was raised ten or twelve inches by steam-power, and the force of the blow was aided by a spring also, and you could get any weight you pleased, light or heavy. You could graduate the power. The pieces came out from the operation about two feet longer. They went in from six to seven feet long, and came out about two feet longer. The object was to get a fillet in the angle, and the effect was to increase the length of both the wide and the square piece about two feet. The iron was moved after every blow. The great object was to give it the filleted corner. It came out of the operation with a fillet. We put it in here to make a square corner outside and a fillet inside. The object of putting the iron in the machine was to form it to our particular pattern. It was put in to change it from the form it had when it went in to the form it had afterwards. It was indispensable to change the form after it was put in order to make good angle-iron. Each blow of the hammer made it a little longer and a little wider; that would be the effect of it. It changed the shape and changed the length. As it was longer from the effect of each blow, it had to move a little within the jaws. I had previously seen a common vise in various forms. I had never seen a vise with a pair of jaws to do this kind of thing. The movable jaws in the machine were the whole length of the fixed jaws, to the best of my recollection. I made the pattern myself. I have not seen it since about 1850. I think that the jaws of the machine were square. The top surfaces were square. We merely rested the piece on this clamp, and not on the bottom. The wide piece didn't rest on the bottom. We hammered on both parts of the machine. The recesses were so adapted that the wide part didn't touch the bottom. The iron anvil was underneath, at the bottom of these recesses, and so low down that the piece didn't touch the
619 bottom. The anvil really was the centre piece, and that took all the blows; that and the clamp furnished the anvil part, and whenever we used the hammer the limb which we wished to make thinner or wider was always over the anvil part, excepting the part that descended between the clamps. It was never turned over the clamp at all. The anvil part was the block.

Direct examination resumed:

The purpose of this machine was to hold, by a movable jaw, the limb, next to the movable jaw, whilst you were working on the limb that was above to hold it while the hammer came down, and when the hammer came down to let it go. The jaw preserved the shape of the limb which was against the movable jaw. There would be no difficulty in welding the two pieces together between these jaws. The machine was so constructed that if the limb of the angle-iron had been wide enough it would have touched the bottom. If I had wanted to make a piece of iron without a fillet, I could make it on a machine like the model, with the square corners.

Cross-examination resumed:

When we commenced, the wide part of angle-iron was within about an inch and a half of the bottom. If it had touched the bottom at the commencement it would have prevented us from making it any wider. It was necessary that it should not touch the bottom.

Testimony of John Cooley, taken in open court at the trial in Chicago, in 1867.

JOHN COOLEY, witness for defendant, being duly sworn, was examined in chief by Mr. Cozzens, and testified as follows:

620 Q. Mr. Cooley, where do you reside?

A. At Springfield, Mass.

Q. What is your business?

A. Forging bayonets.

Q. How long time did you work on bayonets and where did you do the work?

A. I have worked about twelve years on forging bayonets.

Q. Where?

A. In the armory in Springfield.

Q. Will you state to the court how they forged the socket-portions of bayonets at the Springfield armory while you were there?

WITNESS. These are holes in the bayonet all the way through. Do you want only the socket part?

COUNSEL. Well, you had better begin with the commencement of the rolling and follow it through.

WITNESS. Well, in the first place the blade part of the bayonet is made out of a square steel $\frac{5}{8}$ inch square, about so long, (indicating length with model.) In the first place the neck is long—the neck is round—in that shape. Then it is drawn out nearly as long as the bayonet-blade and into a point. Then it is put into swedges—that is the way it was done some two years ago—put into swedges under a trip-hammer; the blade is set right down into a die in this shape (illustrating with model) to meet a groove on that side; then after that it is bent over, and then it is put into one of the anvil-vises; after it is bent over it is put into an anvil-vise in this shape, (expl.,) and this block together with the treadle-block comes down slightly and holds it firm all around in here, and then a hand-hammer or a sledge is applied and pounds it down in that shape. Then *with* a square piece of iron about two inches square and the thickness of a half an inch is taken, and the

621 tongues take hold in that shape. The jaws of the tongue is just as long that (expl.) is, and that is drawn right out and a common straight piece stuck on here; then this is taken in another vise and both blades heated up to a welding-heat—the steel and the iron; this is all

cast-steel; the piece is stuck on there in that shape, so it will just hold on there in this vice. Then it is put into the fire again to get the proper heat on, and then put into this vise, and then put under the trip-hammer that lowers down, and this is the form, just the shape, as you see. All around here is the head and the bridge; then it is put on a tool in the anvil which is nearly like a U, bent right up just enough to turn this up, and a set-hammer is held right on that; the helper strikes on that, driving it right down; that opens this right up in the shape of a U, and then bent something like this (expl.) for the helper to take hold of; the helper strikes this and brings it right up into that shape; then, after, it is brought up into this shape, (expl.;) then there is a welded heat put on to it and it is laid into an open die in that way, (expl.;) it is knocked down a very little, and then taken and put into the fire again, and a heat taken around the top and put into a vise, an anvil or vise in this shape, which fits all around it closely after the heat is got right on the surface there and put into that, (expl.;) then the helper stands behind and drives in a pin, and then a trip-hammer plays right on the top, and that welds the bayonet-socket all firm and nice.

Q. That completes the welding of the socket, does it?

A. That completes the welding of the socket—the welding of it on.

Q. Will you state whether or not these models which you have
622 used to illustrate your answer correctly represented the actual vises as they were used in Springfield in the way you describe?

A. Yes, sir; I think they do.

Q. State whether they are correct in respect to the height to which the jaws come up with reference to the size.

A. Yes, sir; that one does very correctly, I think.

Q. You mean the one with a trip-hammer?

A. Yes, sir; that is, in the socket, sir.

Q. State also whether they correctly represent the actual vises in respect to the support given to the under part of the socket in that vice.

A. I think they do, as near as they can do.

Q. State also, Mr. Cooley, whether in the actual machines the hammer is just as is represented on the top of that vice and acts as a swedge.

A. It does.

Q. How long, to your knowledge, have such anvil-vises as these been used at the Springfield armory?

A. Well, I think it was in 1842. I worked there at the time the first one was made.

Q Did they use these vises such as you describe? What sort of instrument did they use for forming any part of the socket of the bayonet?

A. They had a heading-work which they used. When I first came into the armory they used a thing like this, (indicating with model.) In those days they were made of steel and iron, and they then bent it over after they had rounded this by hand—bent it over and put it into this vise and struck it on the side with a hand-hammer, and the helper here had to screw this up every time. It took a good deal longer; therefore they put this into operation. That is the way they did it.

623 Q. Mr. Cooley, have they used the trip-hammer at the armory for hammering the tops successfully for a great many years?

A. Yes, sir. Since 1845, I should think somewhere about there.

Q. Will you state whether this clamp used in the way you described, and also the anvil-vise, whether they kept the neck of the bayonet from spreading or being crowded down?

A. Why, they had to be kept in good shape or they would get spoiled in making.

Q. Well, what was the effect of putting them upon that clamp in a vise and hammering in an anvil-vise.

A. It kept it in its right shape. They all have to be gauged to exactly the same size. If they are not just fitted to the gauge they are cut down.

Q. They have all to be of the same gauge?

A. Yes, sir. All of the same gauge. There is a large fin right up in here, and right under here. They are very particular to have them all in their places.

Q. Mr. Cooley, do you know how they manufacture gun-lock hammers at the Springfield armory?

A. Yes, sir.

Q. Will you describe that? Use any models you see here.

(Witness, with the aid of a model, explained as follows:) This anvil-vise is very much the same thing. The iron is of that size. That is the size of the iron they make them of. It is broke down in what we call a jumper. It is put right under a jumper-box and just hammered in that shape which gives it exactly the right size. Then it is put in here in that shape. And here is a treadle on here that you put your feet on and hold it firm. Then there is a little small chisel just strips it down there a little; a little set-hammer put on there bends it over—
624 drives it right down in that hole in just that shape. It is held very firmly in this. There is a set-hammer on that, and it is held firm enough so as to retain it exactly in this same shape.

Q. How is the metal of the gun-lock hammer worked, cold or hot?

A. It is worked hot.

Q. Are these gun-lock hammers required to be made all of the same gauge?

A. Yes, sir; they are.

Q. How long have you known anvil-vises for making gun-lock hammers like that to be used at the Springfield armory?

A. Well, I can't state exactly, but they have been made at the water-shop where I worked since 1850. Previous to that they were made on the Hill, and my business didn't take me there.

Q. Does that model correctly represent the gun-lock and the vise they used?

A. It does.

Q. Does it with respect to the height of the jaws—with reference to the work held in it?

A. Yes, sir.

Q. State, if you know, the mode adopted at the Springfield armory for heading ramrods.

A. Yes, sir. The kind of ramrod which was used in the model of 1855, ten or twelve years ago, was made in this model.

Mr. STOUGHTON, (for plff.) The model is of what age, Mr. Witness?

A. The model of '55. Well, I may be mistaken.

Mr. COZZENS. He means the patent of the ramrod.

WITNESS. It might have been later. I can't say certainly. No, sir. The model of '55 had a swell in front, and this is very much the
625 same with the exception of the swell. The head is made under the drop, and well hammered all around.

Mr. STOUGHTON, (for plff.) Excuse me a moment. Is this to antedate our patent? I haven't heard of this before. If it is of an antedate, it does rather.

Mr. COZZENS. It is but another illustration of the same principle that runs through the whole.

Q. How long have you known of that mode of heading ramrods, Mr. Cooley, in use at the Springfield armory?

A. I should think about five or six years. It was during the war.

Mr. COZZENS. O, well, no matter, then. I was under the impression it went back earlier than the invention:

Cross-examination by Mr. Stoughton:

Q. Mr. Cooley, what position did you hold in the establishment whilst working there, twelve years or thereabouts?

A. For the last five years nearly I was assistant foreman.

Q. What position did you occupy in '52 and '53?

A. I was a workman, sir.

Q. When did you begin to adopt these new forges, new kind of vises, of which you have spoken?

A. Well, I think it was in 1842 or '45. Along there between 1843 and '45.

Q. Now, you illustrated the old mode of making the bayonet, or that part of it which you made in this way by the common vise with
626 a sort of subvise, within the jaws of which it is held by that instrument; that you state was the old manner; now, this is the common vise, isn't it? It has been known for a great many years.

A. Yes, sir.

Q. Both in wood and iron? And you inserted within the jaws of that vice an instrument such as I see there, which is also a vise, isn't it?

A. Yes, sir; a sort of a vise.

Q. Well, what is it?

A. That is what we call a clamp.

Q. And the bayonet was held in that?

A. Yes, sir.

Q. Now, you said that the use of that was slow as compared with the use of the others.

A. Yes, sir. Rather slow.

Q. About what advantage did you gain in the quantity of work you could do by substituting for that old vise the other vise which you afterwards employed?

A. (No answer.)

Q. You were examined upon a previous trial, were you not?

A. Yes, sir.

Q. Do you recollect stating then that the difference was about forty per cent. in favor of the new forms?

A. Well, they have made some improvements since I was there, then.

Q. I will confine you to the forms in existence in 1852. Was not the difference in practical value for the purpose of doing the work about 40 per cent. in favor of the new vise over that?

627 A. Well, I should think it must have been.

Q. Well, that you considered an important improvement, didn't you?

A. Yes; we did.

Q. Now will you be kind enough to look at the vise I see at your feet. Is that an actual working vise for the purpose of welding the socket of a bayonet?

A. I think it is.

Q. One which has actually been used for that purpose?

A. It looks like one that has been used for that purpose.

Q. Now won't you be kind enough to take hold of that handle and pull down the hammer. It springs back, I observe.

A. Yes, sir.

Q. That is the case with all your machines, isn't it?

A. Yes, sir; they are all calculated to spring back.

Q. The cam is never so arranged with reference to the jaw that when the handle is drawn down it is held?

A. No, sir.

Q. You don't permit that to be the working condition of your machine?

A. No, sir.

Q. Now, you work this with your feet; this is a treadle-vice, isn't it?

A. Yes, sir.

Q. That's what you call it. Did you tell us what you called it
628 down to '53; what you called it until within three years; did you call it a treadle-vise then?

A. Yes, sir.

Q. That was the name, wasn't it?

A. I think so; yes, sir.

Q. It hadn't got attached to it at that time the name which you now suggest? Now, sir, will you look at these illustrations which we have here. Take one, for instance. I observe that there is such a relation of the cam to that jaw that when the jaw is closed and don't swing open, the lip is held there, you observe?

WITNESS. Yes, sir.

Q. You didn't notice that before, did you?

A. No, sir; I didn't notice that.

Q. Well, now, look at that. You observe that that approaches in the same way by the relation of the cam to the jaw, don't you?

A. Yes, sir.

Q. Well, now, in these particulars, no matter whether they are important or not, they are not like the vise you use, are they?

A. Yes, sir.

Q. Well, in that respect I say they are not like the vises you use, are they?

A. That one is, I believe. It is a wooden machine.

COUNSEL. No matter. Do your working machines operate in that way?

A. I say it is calculated to be. Just to come down and swing open.

Q. That is the original machine?

A. Yes, sir.

629 Q. Now, won't you be kind enough to look at this for a moment. The purpose of the machine is to put your bayonet-socket in there—let it rest for the purpose of welding the socket upon the top, which is exposed, isn't it?

A. Yes, sir.

Q. And when it is welded it is like that, isn't it?

A. When it is done, it is like that.

Q. When it has received the requisite position here it presents an appearance like the socket I now show you?

A. Yes, sir.

Q. After it is welded; the purpose of putting it there is to weld it?

A. Yes, sir; that is the purpose.

Q. The purpose is to weld it together in that point?

A. Yes, sir.

Q. Now, where do you finish it?

A. It goes to the finisher then, after it is welded.

Q. Now, sir, after it is welded, how do you ascertain whether that bears the right relation to the socket as to the length of shank or not?

A. By the gauge. Every man has a gauge.

Q. After welding, and before they go to the finisher, they gauge the shank, so that it bears its right relation to the socket and blade?

A. Yes, sir.

Q. After they gauge them, if they find it don't bear the right relation to the socket and blade, what do they do with it to make it bear that relation? After welding, you gauge to see whether that shank
630 bears its right relation to the socket and blade. Now, suppose it don't, what do you do with it?

A. If you can't alter it, it is condemned.

Q. No. But if it don't, what do you do with it? You alter it, don't you?

A. Yes, if we can.

Q. Where do you take it for the purpose of altering it? To what machine, if any?

A. There is no machine.

Q. What do you do it with if you don't do it with a machine?

A. Well, there is not any way that I know of that we do it; but we calculate to keep them in just that shape as near as they can be.

Q. But suppose they are not when you gauge them?

A. If they won't go we condemn them.

COUNSEL. No, no. After you have taken this out from that vise—after welding all that is gauged—have you not to gauge it, and change it if it is wrong, so as to give it the right direction—the right relation to the stock and the blade?

A. Well, they are all swedged; they are swedged after they come out of the vise.

Q. Well, I am asking you what you do with them. After the welding is completed and that part of the forging is done you have to swedge it, don't you?

A. No, sir.

Q. Don't you swedge this?

A. We have no hand-swedge. We have a drop-swedge that swedges the whole socket, shank and all. That is the swedge that goes around there and lays down in that shape.

631 Q. Then after this comes out from that vise, you have to swedge, which acts upon this, and operates both upon the shank and the socket, don't you?

A. Yes, sir.

Q. A part of the socket?

A. Yes, sir.

Q. Well, that swedge tends to make the relation of blade and socket and the shank right if not right before, does it not?

A. They are all right if we can only get them in there.

Q. What do you put them in there for if they are not all right?

A. To reduce the size.

Q. If the size is reduced the shank is lengthened, is it not?

A. No, sir; it is not.

Q. Not when the size is reduced?

A. You can see by that, it brings a little bar out of the set; the set is made of a piece of cast steel about six inches long. It is made in that way, and then the block comes down on that.

Q. Now, you say if it is not just right, why is it that it springs up that part of the steel if it is just right?

A. Sometimes they vary the die around in the neck a very little.

Q. If it is just right, you wouldn't put it in?

A. Yes, sir.

Q. The operation of the swedge is to upset it and give that fig-
632 ure to it; and that die and that swedge is the die and swedge that furnishes the mode which gives exactly the right direction to the socket?

A. Yes, sir.

Q. Now, after that swedging operation, they go to the finishers?

A. Yes, sir.

Q. Now, sir, I think you presented that (exhibiting model) to illustrate something, didn't you?

A. Yes, sir.

Q. Did you present it to illustrate how you formed the bayonet?

A. That is a pattern of the bayonet-blade.

Q. Before the blade is forged the blade comes from that pattern?

A. Yes, sir.

Q. How long have you known that part to be formed thus before the formation of the blade—how many years?

A. Well, I can't say exactly; I think twelve or fifteen years.

Q. Twelve years?

A. Yes, sir.

Redirect examination by Mr. Latrobe:

Q. I want to ask the witness a question. Do I understand you to say that after the forge has been completed in this, you have a cast-steel die? By a cast-steel die I understand a plain surface in which you have the form cut out, and that form is one-half of the shank.

A. Yes, sir.

633 Q. So as to fit in in that way? (indicating.)

A. Yes, sir.

Q. I understand you to say that the relation between the blade of the bayonet and the socket of the bayonet is exactly right, which you measure by a gauge?

A. Yes, sir.

Q. By a gauge I understand you to mean a piece of metal which you apply in that way?

A. Yes, sir.

Q. If there is a half or a quarter or an eighth or sixty-four one hundredths part of an inch, will the blade and the socket and the shank that you have taken off from this machine fit into the die, around upon it and the drop-falls?

A. No, sir.

Q. Therefore before that die can be used, which Mr. Stoughton has referred to as completing this size of the bayonet, the parts must be perfectly maintained here? (indicating.)

A. Yes, sir.

Q. Sir, will you explain again to the court how the relation between the blade and the socket is maintained?

Mr. Stoughton. He went over that in the direct examination.

Mr. Latrobe. Very well. (To the witness.) When this die comes down the relation between the blade and the socket of the bayonet is established in this machine, and the bayonet being then placed in the die you speak of, what is the purpose of the hammer that falls?

A. It is to get the proper shape.

Q. Can that blade elongate that in any way?

A. Not a bit. No, sir; it can't.

634 Q. All that it can do, if it is not exactly in the right shape, is to put out these bars?

A. Yes, sir.

Q. Mr. Stoughton has spoken of this as being fastened; will you tell the court how this is done?

A. All we do is to put a little piece of tin in behind the back and tie it on.

Q. Will you tell the court whether there is a contrivance in there to force it open the same as in this?

A. Just the same, sir. Just the same.

Q. There is the same spring here that is there?

A. Yes, sir.

Q. Will you look at this machine and say whether it is constructed in the same way?

A. Just the same, sir.

Mr. STOUGHTON. You said to my brother Latrobe that you could not elongate the shank. When you put the shank into the swedge and swedge it and give it its last finish before going to the finisher, it can't go out in any form other than the form which the swedge gives it?

A. No, sir.

By Mr. LATROBE:

Nor any other length?

A. It has got to be of a length when it goes into the swedge.

By Mr. STOUGHTON:

And form, too, hasn't it?

A. Yes, sir; and size, or very nearly so. We can have no fins of any amount.

JOHN COOLEY.

My name is John Cooley; age forty-four years; residence, Springfield, Mass.; and am assistant foreman in the trip-hammer de-

635 partment at the United S ates armory in Springfield. I have been employed in the armory twenty-eight years, in the trip-hammer shop pretty much all the time. For most of the time I have been in the same room where the bayonets were forged, and for most of the time since 1855 I have worked on forging the blade and neck of bayonets. For about seven years it was my business to forge the bayonet and neck, and the head ready for welding, as shown in model 2. When I first came into the armory to work, the bayonets were headed in the following way: A vise and clamps were used like models B and F. The neck of the bayonet, as in No. 1, was screwed up in the clamps for the purpose of heading it. It was headed by two men striking on with hand-hammers, and the result was it was made into the shape No. 2. The blade, 2, was welded to a plate like No. 3 by heating the two, placing plate 3 on an anvil with the flat side up, holding the head of blade 2 on to the flat side of the plate, and driving it down with a set. Then after that another heat was taken on the article, and then it was laid upon a stake with a notch upon one side, so as to admit the neck of the bayonet, which turned freely in it to the right and left, and was not clamped. The plate was then pounded on top with a sledge and hand-hammer, to complete the weld, and to form the bridge on the under side of the plate, and also to reduce the plate to the right thickness. The next thing was to shear the plate to the right size, which was done by shearers worked

by hand. Then it was put into a U-shaped stake, the edges being first scarfed down for welding, then it was curved up like a U, then a mandrel was laid inside, and the edges bent over it till they overlapped. Then the mandrel was knocked out, the socket again heated, and then put on to a horn, like the horn of a blacksmith's anvil, only smaller,
636 and then two men struck on it with hand-hammers, until it was welded. By this process the necks were not all of the same length or size. After the model was changed from flint-lock to percussion-lock, it became desirable to have the necks all uniform length and size. The machine represented by model C was got up to effect this. Vise C took the place of vise B, because it held it better and preserved the neck in its right shape, and would do the work quicker. It would do it quicker because I could put my foot on the foot-vise quicker than I could screw up the screw in machine B. The necks of all bayonets forged in vise C were intended to be and were all of uniform size and length, and were of the same dimensions when it came out of the machine as when it went in. No. 2 was first headed in a vise like C, and then to form No. 4 pieces 2 and 3 were heated, and then No. 2 was again put into vise C, and a piece like No. 3 was held on top of it, and then the two were welded together by hand-hammers by two men. Then another welding heat was taken on to it, and it was carried to a vise like model D, and was plated out like No. 5, and then taken out and sheared off to the size of No. 4. The socket was then formed in the manner already described, and the edges lapped for welding, and this mode of forming the socket was used until 1855. Then in 1855 the model of the musket was changed from a musket to a rifle. The blade of the bayonet was then made two inches longer and slimmer. The grooving also was changed, and the bridge on the socket was changed from the top side to the under side of the plate that formed the band. The machine like vise E is used in the armory for blocking hammers for percussion locks. The iron is first formed into shape, like No. 8, by a drop. It is then put into the vise E. The vise is for the purpose of holding it while they split down the
637 head, h, to form the head of the hammer. It is first split with a chisel, then a set like No. 10, only less hollowing, is applied to it and it is driven down with a sledge into shape nearly as in piece No. 9, and then it is taken out of the vise and flattened a little, and the nose of the hammer upset a little, and the comb flattened a little. It is then returned into the vise, and brought into shape, like No. 9, by the use of swedge No. 10. All the machinery represented by models C, D, and E were in operation in the armory before the year 1845. The dies were changed from time to time as they wanted them, but the vises have not been changed. The vises were made to hold the neck and to preserve it in its peculiar shape, in the same shape as it was when it was put in, so that it should not be any longer or thicker.

Int. 1. (Objected to.) The modification of any one of these vises being given in which the cam takes the place of the screw and the common vise, the jaws adapted to changeable dies to hold the neck of a bayonet, or the neck of any other thing to be held, would it, in your opinion, require the exercise of inventive skill to form dies to hold the neck of any other thing that might be given?

A. I should think not. It would take some skill to make the dies.

Int. 2. (Objected to.) Would it to design the dies, the thing to be held being given? (The counsel at the same time showing the witness the piece M.)

A. I think not. The thing you have got to hold in the die shows for itself, so that it requires no great skill to design what you want.

Int. 3. (Objected to.) Would it, in your opinion, require the
638 exercise of inventive skill to so enlarge the parts of model C. or either of the other vises, including dies to hold a full-sized railroad-rail?

A. I should think not.

Int. 4. (Objected to.) In a vice so modified could a railroad-rail be practically repaired?

A. I think it could.

Int. 5. (Objected to.) In your opinion could a railroad-rail be so repaired by a trip-hammer, there being a swedge in the trip-hammer to fit the tread of the rail?

A. Yes. I think it could.

Int. 6. (Objected to.) What would be the peculiar office of a vise so modified?

A. If you fitted your dies to the rail, it would be to hold the *the* rail so as not to get away.

Int. 7. (Objected to.) Would it hold and preserve the neck of the rail?

A. It would.

Int. 8. (Objected to.) Is the office of a vise in thus holding and preserving the neck of a rail, the same as that performed by a vise in holding the neck of the bayonet?

A. I think it is the same. The principle is the same thing.

Int. 9. (Objected to.) And is the principle of holding the neck of a hammer the same as that of holding the neck of a bayonet and of a railroad-rail?

A. Yes, sir.

Cross-examination by plaintiff:

1. X Int. State whether you were present during the cross-exami-
639 nation of Mr. Luke Pratt, in this case, and have since heard his testimony on cross-examination read to you.

A. I answer yes to both branches of the question.

2. X Int. State whether the answers made by him to the cross-interrogatories were correct or incorrect, to your knowledge, and whether you agree with him in the statements then made by him.

A. I think they were correct, and I agree with him.

JOHN COOLEY.

LUKE PRATT.

My name is Luke Pratt; age fifty-nine years; residence Springfield, Massachusetts; and am now assistant foreman in the water-shop of the United States armory at Springfield, and have been two years. I have been employed in the armory for the last thirty-two years, and for between twenty-eight and thirty of those years my business was forging and welding gun-barrels.

The business of forging bayonets was also carried on in the same room pretty much all the time, and under my constant observation, so that I am perfectly familiar with the process of forging bayonets, although I never personally worked at it. I am also familiar with the machinery which was and has been used in the armory in forging bayonets, and also for blocking gun-lock hammers and heading ramrods.

The first thing I recollect that was used in the armory for forging bayonets was a device correctly represented in the models now present, namely, a common vice marked B, and a clamp marked F. When they wanted to upset the head of the bayonet in order to bring into shape to

weld on the piece which formed the socket, they put the bayonet, when
in the condition represented by the iron model No. 1, into the
640 clamp F, placing the clamp F between the jaws of the vice B and
screwing it up tight. The object of this was to preserve the neck of the bayonet in its proper shape, so that it would neither thicken nor elongate by the process of heading. While the neck of the bayonet was thus held, the head was hammered into the shape represented by the iron model 2, so that the piece to make the socket could be welded on to it. After several years the process as just described was dispensed with; and the foot-vise, as represented in model C, was used in the place of it. The process was the same, only instead of a screw they used a foot-vice and cams; and the jaws, instead of being separate, as in clamp F, the dies were first made a part of the jaws as in model C. They subsequently found that it was difficult to repair the dies while in the jaws, so they took them out and substituted movable dies which could be put in and taken out.

After the piece No. 2 was formed, it was heated to a welding-heat and then put into the dies, as in model C, and a piece like that, marked 3, was welded on to it, while the neck of piece 2 was held in the dies, which brought it into shape like piece 4, and the edges of the plate were rough, and the plate was thicker than the plate of No. 4. Then it was put into a vice, as represented in model D, and the plate was flattened out until it was about the size of No. 5, and the bottom of the plate was brought into the shape shown in No. 5. The edges of the plate were then sheared down until the plate was about the size of the plate of 4. The object of the dies of D was to keep the neck of the bayonet in shape while the plate was hammered out. Then the plate of No. 4 was put into or rather held over the groove of a stake in shape like the letter U; then the centre of the plate was driven down into the groove by a hammer, and
set so as to give the plate a V-form, and then the edges were
641 brought together over a mandrel by use of a hand-hammer, until brought into the form represented in iron model No. 6. Then piece No. 6 is brought to a welding-heat and laid sideways on a die having a hollow in it corresponding to one side of piece 6, a mandrel is put through the band, and the upper half is hammered by the trip-hammer, the face of which has a hollow in it corresponding with the upper half of piece 6. This operation welds up the seam of No. 6. It is then heated again to welding heat and then put into a foot-vice like D, but with dies made to correspond with the neck of the bayonet and half the socket, and it is then hammered by a trip-hammer again, with a mandrel in the socket, until it is brought externally into the shape represented by model 7. Before the bayonet is entirely finished, it is hammered again on its side in the die described before the last foot-vice, for the purpose of removing the fin and giving a finish to the socket.

Model E is a representation of the vise and dies used in blocking hammers at the armory.

A piece like figure 8, previously prepared for the purpose, was placed in the dies of model E, then the head, h, of the figure 8 was partially split down with a chisel; then a swedge something like model 10, only not so hollowing, was driven down on the piece 8, with a sledge, with a helper. Then the piece 8 is taken out and upset, and flattened a little on a stake, and is then put back again into the model E; then the swedge 10 is hammered on to it, and the head is thus finally formed as shown in iron model 9. During all this operation the neck of the hammer is kept in shape by means of the dies as in model E. Vises are also used at the armory with dies, like models C, D, and E, for the pur-

pose of holding the ramrod while forming the head. The dies, of course, are made to conform to the shape of the rod, and the vise is
642 worked by hand, but with a cam. The rod is held in the die perpendicularly, and the hammering is done by a drop on the end of the rod. The drop weighs, I should think, about a hundred and fifty pounds. Model 11 represents the rod before it is headed. Model 12 represents it after the first step in heading. It is then heated again and put into another pair of dies, and dropped a second time, which brings it into the shape of piece 13.

A similar vise is also used at the armory for heading swivels. This vise is operated by the foot with cams. Piece 14 is put into the dies endwise, and hammered endwise into the form shown by figure 15. One end is hammered at a time. The dies have a socket to them, which gives the shape to the head, as shown in figure 15. During the process, the neck or rod of the swivel is held in the die, so as to keep it of the right size and length while the head is being formed in the manner described.

Int. 1. State if you know when and at whose suggestion the machinery represented in model C was substituted for the vise and clamp as represented in models B and F.

A. I should think it was substituted as early as 1838 or 1840, and I think Timothy Allen did the first work on it, but I don't know who made the plan of it. I know it was in use as early as then, for I worked very near it. About the year 1842, as early as that, the machinery represented by model D was got up. It was got up in the armory, but by whom I don't know. The machine for welding the bayonet-socket and finishing it under the trip-hammer were got up by Samuel Chandler as early as 1843, for I think he died in 1844.

The machine represented by model E was got up in the armory
643 as early as the year 1843 or 1844. I don't know who got it up, but it was got up by somebody in the armory.

Int. 2. Whether or not in your opinion the vises, models D and E, are but modifications of the model C, except changing the dies to fit the neck of the thing to be held in the process of upsetting, welding, forming, or re-forming.

(Objected to.)

A. No, sir. I only think they are the modification of the dies. I think they are all the same thing—only changing the dies.

3. What particular office is performed by each and every one of their vises?

A. To hold the neck of the bayonet in its proper place so that it will not thicken or lengthen or shorten any.

4. What effect would the welding of Nos. 2 and 3 together have upon the neck of No. 2 were it not clamped in the dies of model C?

A. It would have a tendency to draw the neck of No. 2 so that it wouldn't be the right size for any subsequent operation.

5. What office do the dies in vise E perform in working figures 8 and 9?

A. They keep the neck of the piece 8 in shape while the head of the hammer is being formed into the shape 9.

6. The counsel for the defendant here removes the dies K K from model D and substitutes dies (objected to) L L, and inserts in the dies piece marked M, representing a railway-rail, and places upon it the piece N to be welded to it, and asks the witness:

(Objected to.)

644 Is the office performed by vise D in welding figures 2 and 3 to form figure 4 with the dies K K the same as welding N to M with the dies L L?

A. It would be the same thing by holding it so that it would not lose its form in either case.

7. In your opinion, could vise D, by suitable modifications to correspond to size, be used in mending railroad rails successfully?

(Objected to.)

A. I think it could be, just as well as to do the other work.

Cross-examination by plaintiff:

1. X Q. State whether the introduction of the machine represented by model C was regarded in the armory as an improvement in the manufacture of the bayonets over the old mode by the use of the new vise B and clamp F.

A. It was, as a great improvement.

2. X Q. Previous to the introduction of the machine represented by model D, how were the sockets plated?

A. They were plated by laying them on a stake with a loose groove in it and plated by sledges and hand-hammers.

3. X Q. State whether that stake griped the neck of the bayonet and prevented its change of form.

A. It did not gripe it nor prevent its changing its form. It (the neck) would lengthen a little.

4. X Q. State whether the introduction of the machine represented by model D was regarded in the armory as an improvement in the manufacture of the bayonet.

645 A. It was, as a great improvement.

5. X Q. How was the socket welded up and finished before the introduction of the two machines which you say were introduced by Mr. Chandler?

A. They were welded up by hand. The edges of the socket were lapped instead of being brought side and edge, as shown in piece 6, and they were welded together on a horn.

6. X Q. State whether the introduction of the two machines by Mr. Chandler was regarded in the armory as an improvement in the manufacture of bayonets.

A. It was a great improvement. It saved nearly a quarter of the labor in doing that particular work, and made a much better article.

7. X Q. Are not trip-hammers used in connection with the machine represented by model D, and with the two machines introduced by Mr. Chandler for welding up the socket of the bayonet?

A. Yes: there is a trip-hammer for each one.

8. X Q. State the position of the head of the trip-hammer and the direction in which the helve extends.

A. The head of the hammer stands above the dies and rises about three and a half to four inches in making the blow. The helve extends in a line of the blade of the bayonet, but in the opposite direction from the dies.

9. X Q. State as nearly as you can the distance from the dies to the centers or pivots on which the trip-hammer plays up and down.

A. About five feet.

10. X Q. The centers are supported in a large frame, are they not?

646 A. They are in a large ring frame, called a husk, and from which the centers project to the right and left.

11. X Q. How far below the level of the top of the dies does this husk extend?

A. About five inches.

12. X Q. State whether the dovetails of the dies K K are length-

wise as they are represented by the wooden model, or are crosswise to the dies in the working machine.

A. They are crosswise.

13. X Q. In all of the machinery to which you have testified, is not the piece so clamped that the hammering or dropping is done endwise to the length of the part which is griped in the dies?

A. It is.

14. X Q. State whether the machines represented by the models C, D, and E, are of the same size of the models, or larger or smaller.

A. I should think model D was a little shorter than the working machine; the other two I should think were about the same size.

15. X Q. How do the machines introduced by Mr. Chandler for welding the sockets correspond in size with model D?

A. Chandler's machine may have been a very little larger each way, perhaps one quarter of an inch, and was about the same height.

16. X Q. Did you ever see a railroad-rail for practical use on roads of the size represented by piece M?

A. No; I don't think I ever did.

647 17. X Q. State whether, in your opinion, it would be possible to patch an ordinary railroad-rail, such as are used on railroads, by using any of the machines in the armory to which you have testified, using those machines in their present condition.

A. Of course you couldn't.

18. X Q. The dies represented by letters L L are of the same proportionate size as the parts of model D, are they not?

A. I should think they were about the same proportion.

19. X Q. Did you ever see a pair of dies like L L put into the working machine represented by model D?

A. I never did.

20. X Q. Suppose you were to put a pair of dies like L L into the working machine represented by model D, instead of the dies represented by K K, and were to make no other change in the machine or in the trip-hammer combined with it, could you then, in your opinion, use that machine for patching the ordinary rails in use on railroads?

A. Of course you couldn't do it.

21. X Q. Would the machine, when changed as stated in the last question, be of any value for the purpose of manufacturing bayonets?

A. It would not be with those dies in for the manufacture of bayonets.

22. X Q. State whether any welding is done with the machine represented by model E.

A. Not any.

648 23. X Q. State whether any welding is done upon the machines used for welding the socket, except by the use of the mandrel inside of the socket.

A. No.

Direct examination resumed:

1. D. I. R. Is a trip-hammer used when welding pieces 2 and 3 to form piece 4, or some other hammer?

A. A common hammer is used first, with machine C, then the welding is completed in machine D, by the use of the trip-hammer.

2. D. I. R. State whether machine represented by model C was prior in point of date to the machines represented by D and E.

A. It was.

3. D. I. R. Could the work performed in vise C be performed in vise E, as it now stands, without any change of dies?

A. It could not.

4. D. I. R. Could the work performed by D be performed by either of the other vises without change of dies?

A. It could not.

5. D. I. R. All the parts of foot-vise C being in use and understood, would it require mechanical skill to change the dies to fit any other form of work to be held in the process of upsetting, welding, or forming?

(Objected to.)

A. No. All the mechanical skill would be to make the dies to fit the work to be done.

6. D. I. R. Would there be any novelty in the exercise of such skill in your opinion?

(Objected to.)

649 A. I shouldn't think there would be any great novelty in it to shift the dies.

7. D. I. R. Would there be any novelty to it?

(Objected to.)

A. There would be no novelty, because you have your patterns all made, and all you have got to do is to put your dies in. Any one could do it.

8. D. I. R. Assuming that rail M is constructed on a scale of one-third of the size of the ordinary railroad-rail in use, (except length,) and that there is a correspondence between rail M and dies L L, in vise D, and the parts of the vise itself, would it, in your opinion, require mechanical skill to increase the dimensions of all the parts named three times, for the purpose of holding an ordinary railroad-rail in the process of welding upon the tread?

(Objected to.)

A. I should not think it would, for they would know they had got to do it if they had got to do such work.

9. D. I. R. In your opinion would such a vice so modified be a serviceable machine in mending railroad-rails?

(Objected to.)

A. I should think it would.

Cross-examination resumed:

24. X Q. State whether or not the bayonet and other machinery to which you have testified, was used publicly since each of the machines was got up.

A. It was.

650 25. X Q. Describe how the hammer-heads were formed before the introduction of the machine represented by model E, if you know.

A. I don't know.

LUKE PRATT.

HENRY G. WALLACE.

My name is Henry G. Wallace. My age is fifty-five years. Residence, Springfield, Massachusetts; and I am at present a die-sinker in the United States armory at Springfield. I commenced there in the year 1842, and have been out of the armory, since then, about eight years in all at different times. I have been foreman at the upper water-shops about four years, inspector about six months, assistant foreman about three years, remainder of the time I have worked as die-sinker. Since 1842 I have been familiar with the machinery used in forging bayonets. I have not used it myself, but I have seen it used.

wise as they are represented by the wooden model, or are crosswise to the dies in the working machine.

A. They are crosswise.

13. X Q. In all of the machinery to which you have testified, is not the piece so clamped that the hammering or dropping is done endwise to the length of the part which is griped in the dies?

A. It is.

14. X Q. State whether the machines represented by the models C, D, and E, are of the same size of the models, or larger or smaller.

A. I should think model D was a little shorter than the working machine; the other two I should think were about the same size.

15. X Q. How do the machines introduced by Mr. Chandler for welding the sockets correspond in size with model D?

A. Chandler's machine may have been a very little larger each way, perhaps one quarter of an inch, and was about the same height.

16. X Q. Did you ever see a railroad-rail for practical use on roads of the size represented by piece M?

A. No; I don't think I ever did.

647 17. X Q. State whether, in your opinion, it would be possible to patch an ordinary railroad-rail, such as are used on railroads, by using any of the machines in the armory to which you have testified, using those machines in their present condition.

A. Of course you couldn't.

18. X Q. The dies represented by letters L L are of the same proportionate size as the parts of model D, are they not?

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20. X Q. Suppose you were to put a pair of dies like L L into the working machine represented by model D, instead of the dies represented by K K, and were to make no other change in the machine or in the trip-hammer combined with it, could you then, in your opinion, use that machine for patching the ordinary rails in use on railroads?

A. Of course you couldn't do it.

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A. It would not be with those dies in for the manufacture of bayonets.

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A. Not any.

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A. No.

Direct examination resumed:

1. D. I. R. Is a trip-hammer used when welding pieces 2 and 3 to form piece 4, or some other hammer?

A. A common hammer is used first, with machine C, then the welding is completed in machine D, by the use of the trip-hammer.

2. D. I. R. State whether machine represented by model C was prior in point of date to the machines represented by D and E.

A. It was.

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(Objected to.)

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A. There would be no novelty, because you have your patterns all made, and all you have got to do is to put your dies in. Any one could do it.

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(Objected to.)

A. I should not think it would, for they would know they had got to do it if they had got to do such work.

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(Objected to.)

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A. It was.

650 25. X Q. Describe how the hammer-heads were formed before the introduction of the machine represented by model E, if you know.

A. I don't know.

LUKE PRATT.

HENRY G. WALLACE.

My name is Henry G. Wallace. My age is fifty-five years. Residence, Springfield, Massachusetts; and I am at present a die-sinker in the United States armory at Springfield. I commenced there in the year 1842, and have been out of the armory, since then, about eight years in all at different times. I have been foreman at the upper water-shops about four years, inspector about six months, assistant foreman about three years, remainder of the time I have worked as die-sinker. Since 1842 I have been familiar with the machinery used in forging bayonets. I have not used it myself, but I have seen it used.

Int. 1. Have you been present during the direct and cross examination of Messrs. Luke Pratt and John Cooley in this case, and did you hear the testimony given by them respectively?

A. Yes.

2. Were their statements in said direct and cross examinations correct or otherwise to your knowledge, and do you or not agree with them in said statements?

A. I cannot say as to what took place before 1842, but as to what took place after 1842 their statements were correct, and I agree with them. I heard everything they stated, I believe, on the subject. I only wish to add that the machine like model C would hold the neck of the bayonet like the clamp F and preserve its shape, but when it was
651 taken out of the clamp F and welded on a stake before the introduction of either the vises C or D, the neck would not remain in the same form; there was nothing to hold it. Vise D holds it in its form while it is welded and plated.

3. Suppose those questions put by me to Mr. Luke Pratt containing the words "mechanical skill," were changed as to read "inventive skill," what is your answer to said questions—the same as Mr. Pratt's, or different?

(Objected to.)

A. My answer would be the same as Mr. Pratt gave.

H. D. WALLACE.

WILLIAM F. DORSETT.

My name is William F. Dorsett; age, fifty-three years; residence Springfield, Mass., and I am an armorer in the Springfield, Mass., armory, and have been for the last twenty-six years. My particular work has been on tools and die-sinking. I have never worked on forging bayonets, but have made the tools and dies for forging bayonets. I am and have been familiar, ever since I have been in the armory, with the process and machinery employed in forging bayonets. My first work was getting up the machinery and tools for the new model musket of 1842, although I commenced work upon them in 1839.

Int. 1. Were you present during the direct and cross examination of Messrs. Luke Pratt & John Cooley in this case, and did you hear the testimony given by them respectively?

A. Yes, sir.

652 Int. 2. Were their statements in said direct and cross examinations, to your knowledge, correct or incorrect, and do you or not agree with them in said statements?

A. To the best of my knowledge they were correct, and I agree with them in their statements.

Int. 3. Suppose the questions put by me to Mr. Luke Pratt containing the words "mechanical skill" are changed so as to read "inventive skill," what is your answer to said question—the same as Mr. Pratt's, or different?

(Objected to.)

A. My answers are the same as his.

WM. F. DORSETT.

653 U. S. circuit court for the northern distr'ct of Illinois. In equity.

SAMUEL H. TURRILL
vs.
THE ILL. CENTRAL R. R. CO. AND JOHN M. Douglass.

SAMUEL H. TURRILL
vs.
CHIC. B. & QUINCY R. R. CO. AND AMOS T. Hall.

SAMUEL H. TURRILL
vs.
MICH. SO. & NO. IND. R. R. CO. AND E. B. PHILlips.

654 SAMUEL H. TURRILL
vs.
CHIC. & ALTON R. R. CO. AND T. B. BLACKstone.

SAMUEL H. TURRILL
vs.
PITTSB., FT. WAYNE & CHIC. R. R. CO., ETC.

Testimony taken on the part of the defendants in the above actions, pursuant to stipulation and under the 67th rule in equity, before Joseph Gutman, jr., examiner.

N. Y., *Oct.* 15, 1869—11 a. m.

Present: Complainant in person, and E. W. Stoughton, counsel for complainant, and George Gifford, esq., and S. M. Whipple, esq., counsel for defendants.

FRANCIS C. TREADWELL, jr., a witness of lawful age, produced on the part of the defendants, having been by me first duly cautioned, and sworn to testify the truth, the whole truth, and nothing but the truth, and being examined by Mr. Gifford, of counsel for defendants, deposes and says:

655 Q. 1. What is your name, age, residence, and occupation?

A. Francis C. Treadwell, jr.; age, 46. I reside in the city of New York. I am by occupation a solicitor of patents and consulting engineer. A large portion of my time, however, is occupied in patent causes, being frequently called to testify as mechanical expert in patent causes in the United States courts during the past ten or twelve years.

Q. 2. Have you read and do you understand the contents of the letters-patent to Joseph D. Cawood, on which these suits are brought?

A. I have read a certified copy of said letters-patent, and understand the contents thereof.

Q. 3. Have you heretofore, and, if so, when and where, been examined as a witness on this patent?

A. I have; once at Detroit, in June, 1865, in a suit brought by Turrill and others against the Michigan Southern and Northern Indiana Railroad Company, and afterwards at Chicago, Ill., in October, 1867, in a suit by the same parties against the Illinois Central Railroad Company.

Q. 4. Have you examined and do you understand a printed copy of the English letters-patent to William Church, dated 5th day of May, 1846?

A. I have examined the Church patent referred to, and understand the contents thereof.

Q. 5. Look at complainant's model, marked "Church Machine," and state whether it is a fair representation of any part of the Church patent, and give your reasons.

A. I have examined said model. It purports to represent, and does fairly represent in most particulars, one of the machines described in said Church patent, that for welding hollow rails, shown in the drawings, figures 31, 32, 33, 34, and 35, and that portion of the
656 description which refers to them; but in some particulars it does not fairly represent said machine, as described and shown in said patent. If the drawings were followed exactly in the construction of this model, the hammer or upper press block could not work, because the link which connects the piston of the engine with the progressive levers which operate that block would have no room to move vertically, as the necessity of the operation requires it to move, the drawings being imperfect, and showing no room in the frame slot through which the link passes for any but a horizontal movement. That a vertical, as well as a horizontal movement of that link is intended, is obvious from the construction of the progressive levers, and also from the fact that the link is jointed both to the piston-rod and to the bar which connects this series of progressive levers, as shown in the drawings, figures 31 and 33. Now, in the model this link is not jointed to the piston-rod, but the necessity of some vertical motion of the link having been perceived by the constructor of the model, in order to have the upper press blocks move up and down at all, the slot through which the link passes extends above and below the link a certain distance, thereby varying from the drawings, but according with the description, so far as it permits a proper operation of the parts. But, although a variation has been thus made from the drawing in the construction of the model, to permit the press-block to work, an inaccuracy of the drawing with respect to the operation of the rods which hold the mandrel, around which the bar is to be welded, has been followed, which prevents these rods from being raised out of the way of the rail when welded, and the mandrel withdrawn, as it is the evident purpose of the machine to do, by means of the angle levers at the top of the frame. In the drawings these rods are
657 represented as having slots in them, and through the slot in one of them the link passes which connects the progressive levers with the engine. This slot, as shown in the drawings, is not long enough to permit of raising the rod and the eye at the end of it, which holds the mandrel out of the way of the withdrawal of the rail, after the operation is completed and the mandrel withdrawn, the link preventing it from being raised high enough; and the inaccuracy of the drawing has been followed in this respect by the constructor of the model, so as to considerably impede the passage for the egress of the rail, when the clear and obvious intention of the machine, as evinced by its construction, and the employment of the angle levers above, is to lift the rods holding the mandrel out of the way of the rail after the mandrel has been withdrawn. There are no joints in the links in the model at the place where they are connected with the piston-rods of the steam-cylinders, as shown in the drawings. The mechanism for hauling out the mandrel, which is shown in the drawings representing this machine, has been omitted from this model. These are all the differences which I observe. Without

taking the model apart, I cannot see whether the dies or surfaces of the press-blocks which hold and weld the rail are in accordance with the drawings.

Q. 6. Look at the model marked "Defendants' Church Machine, No. 1," and state what it represents.

A. This represents the lower part of one of the machines described in the said Church patent, and shown in figures 12 and 13 of that part of the description which refers thereto. The drawings of the patent do not show a steam-cylinder, described in the patent as being connected with the progressive levers, and in the model the steam-cylinder is also omitted, and for convenience a handle substituted.

Q. 7. What can you say as to the function of the Cawood ma-
658 chine being anything more than to hold the bar while being acted upon by some other instrumentality?

A. It has no other function than to hold the bar, or rail, or piece of iron it is fitted to hold, whether it is acted upon or not by any other instrumentality.

Q. 8. What can you say as to the function of such a machine as is represented by "Defendant's Exhibit Church Machine, No. 1," compared with that of the Cawood machine?

A. The functions are the same; they both have press blocks conforming in shape to the side of the bar, combined with means of moving one of the jaws towards the other, to hold or press the bar between them, so that it may be operated upon by another instrumentality.

Q. 9. Look at the model marked "Defendant's Exhibit Church Machine, No. 1 A," and state what it is, and to what it belongs.

A. It is a model of the upper part of the Church machine, represented by the Exhibit Defendants' Church Machine, No. 1, and represents the upper press-block or hammer, for the purpose of operating upon the top of a rail as described in said Church patent.

Q. 10. Look at model marked "Defendant's Exhibit Church Machine, No. 2," and state what it is, and what is its function?

A. It is a model representing a part of the lower part of a machine described in the Church patent, for welding hollow rails; the same machine as represented by complainant's model Church machine, before referred to in my examination. Such parts of this machine as are represented by this model, so far as I can see, are fairly represented. I notice, however, that the progressive levers move the same way on both sides of the machine, instead of being reversed, as in the de-
659 scription and drawings, which I suppose has been done for convenience of operating them by handles at the same side of the machine. The function of this machine is to press and hold the rail between the jaws, which conform to the figure of the side of the rail, while it is being operated upon by another instrumentality.

Q. 11. Look at model marked "Defendants' Exhibit Church Machine, No. 2 A." State what it is and where it belongs.

A. It represents substantially a part of the upper portion of the Church machine, and contains the press-block or hammer, which is the instrumentality more especially described in connection with that machine for operating upon the rail when held between the press-blocks below.

Q. 12. Look at model marked "Defendants' Exhibit Slide-Vise," and state what it is, and how long you have known of such a tool.

A. It is a slide-vise, or parallel-vise, as it is sometimes called, having one jaw fixed to a horizontal iron bed, and the other jaw movable upon said horizontal iron bed, and confined thereto by tongues and grooves. I

cannot say when I first saw such a vise as that. I recollect them as long as I have known about vises, some twenty-five or thirty years more or less, and I have seen them described in books that are at least thirty years old. Similar vises have also been known, containing the same construction in other respects, except in leaving out the screw and using a rack and cam behind the movable jaw to set up the movable jaw.

Q. 13. Look at model marked "Defendants' Exhibit Michigan
660 Southern," and compare such a machine as it represents with the old bayonet-machine and with the Cawood machine.

A. I suppose the bayonet-machine referred to in the question are the machines used at the Springfield armory in the manufacture of bayonets and gun-locks, that I have seen in use at the Springfield armory, and models of which, and also an old specimen of part of one of the forms, were used at the trials in Detroit and Chicago, at which I was present. These models and the old iron machine are now here before me. The model Defendants' Exhibit Michigan Southern, leaving out the side swedge-block for side-swedging the rails, is substantially the same machine, in my opinion, as the Springfield bayonet-machine, because it is adapted to accomplish the same, or an analogous result, by substantially the same means. The bayonet-machine comprehends a heavy chunk of metal fixed in a proper base or support, and the upper end of which contains a jaw formed upon it or secured to it of the shape of the side of the article it is intended to hold. It also has a movable jaw secured to the chunk of metal which holds the fixed jaw by a suitable means, and in the most convenient manner for the special purposes of the machine, the means being a joint; it also has guides, which guide it when moving towards the fixed jaw, the guides being attached to the chunk of metal which holds the fixed jaw; and, moreover, it has a convenient and suitable mechanism for moving the movable jaw towards the fixed jaw, viz, a cam roller, operated by a lever. The movable jaw in the bayonet-machine has recesses formed in it, which are the counterpart of the figure of the side of the article it is intended to hold. There is no difference between Defendants' Exhibit Michigan Southern, excluding the upper side swedge-blocks, and the bayonet-
661 machine, except in the respect of mere form of the recesses or holding-surfaces in the jaws, and in that respect no two of the bayonet-machines agree with each other, the machines being made to produce the various differing but analogous operations and results, by making their jaws to conform to the shape of the article to be held therein, and exposing the part to be operated upon to the action of the hammer. Now, I understand that the machine "Defendants' Exhibit Michigan Southern," is used in an open blacksmith's-shop to hold rails while hammering upon them with common hand sledge-hammers, whereas in Springfield trip-hammers are used; but I do not understand that the kind of hammer used for hammering upon the rail has anything to do with the function or substantial similarities or differences in the machine which holds the rail or other article to be hammered, otherwise one might readily get rid of the Cawood patent, assuming it to be valid, by putting the Cawood machine under a trip-hammer, or other steam-hammer. I do not think there is any more difference between the use of jaws like those in the Michigan Southern Exhibit for mending rails, and the use of jaws like any one of the bayonet-machines, than there is between the use of the jaws of one common vise and the jaws of any other common vise. Their use for holding different things which

are analogous, although called by different names and having different sizes and configurations, I consider a mere change of form.

The Cawood machine has a fixed jaw, fast to a heavy chunk of metal, resting upon a suitable foundation or support, substantially though not in precise form as in the bayonet-machine. It has a movable jaw attached to the chunk of metal which contains the fixed jaw, by convenient means, substantially, though not in form, as in the bayonet-machine. It has guides for the movable press-blocks attached to the
662 chunk, which holds the fixed jaw, which guides the movable jaw towards the fixed jaw, substantially in the same manner though not in the same form as in the bayonet-machine. It has also cams, placed upon a rocking shaft, operated by a lever, to move the movable jaw or press block towards the fixed jaw, substantially the same, though not exactly the same in form, as the bayonet-machine. I cannot describe the difference between the conformation of the jaws of the Cawood machine and those of the bayonet and Michigan Southern machines, because the jaws of the Cawood machine may have the same shape as the jaws of the Michigan Southern machine, or the same shape as the jaws represented in the drawings of the Cawood patent, or they may be "otherwise" shaped, which is a shape that I do not understand; but I suppose it to mean any shape that the ingenuity of man can devise for the shape of the sides of a rail, or for the sides of anything to be held in the machine. I should consider that if any one took the precise machine described and shown in the Cawood patent, and adapted the shape of its jaws to hold a bayonet, or other article to be held and retained in shape while being hammered upon by hammers, sledges, or trip-hammers, or otherwise operated upon or not operated upon, they would have substantially the same machine, producing the same or an analogous result by substantially the same means.

Q. 14. Look at model marked "X, E. A. D.," and state what it represents.

A. This model represents a so-called angle-iron machine, testified to by Edward Greenleaf at the trials in Detroit and Chicago, before referred to in this examination, and is one of the models used in those trials, representing said machine.

Q. 15. Look at model marked "Y, E. A. D.," and state what it represents.

663 A. It represents the fixed and one of the movable jaws of the angle-iron machine represented by Exhibit X, E. A. D., with surfaces made to conform to the figure of the side of a rail, and also represents side-swedges for swedging the sides of rails.

Q. Compare the parts severally, the means combining them, and the mode of operation in the angle-iron machine with the corresponding parts, means of combining them, and the mode of operation in the Cawood machine, and then state whether the machine as described and specified in the Cawood patent is substantially different from, or substantially the same as, the angle-iron machine.

A. The angle-iron machine as testified to by Mr. Greenleaf, and represented in this model, X, E. A. D., has a horizontal chunk or mass of metal, which corresponds with the horizontal chunk or mass of metal called the anvil in the Cawood machine. It is made of cast iron, as also is that of the Cawood machine. Upon this anvil is raised a fixed jaw, cast upon the anvil, as described in the Cawood patent. The angle-iron machine has also a movable jaw which rests upon the anvil, and is guided by guides attached to the anvil when moving towards the fixed jaw, substantially as described in the Cawood patent. It has also a

cam turning upon a spindle or shaft, and operated by a lever, to move the movable jaw towards the fixed jaw for the purpose of griping and holding anything placed between them, as in the Cawood patent. The construction is almost identical, except in mere form, and except that the movable jaw is not held down to the anvil by any device other than the pressure of the cam when griping the article placed between the jaws. This I do not consider a material difference, because the Cawood block will operate well if the movable jaw is not held down by
664 any device except the cam when pressing it towards the fixed jaw to gripe and hold the article placed between them. The shape of the sides of the jaws is not identical with that shown in the drawings of the Cawood patent, and not adapted for holding a T-rail, but nevertheless I consider it identical with the description of the patent, because the shape is adapted to holding other rails which have been, and are now, in use, viz, angle-iron rails and square-bar rails, which have plain sides. Now, I am aware that this angle-iron machine was used for making angle-iron, which was a different process of manufacture from mending rails; but the use to which a machine has been put does not, in my opinion, exclude it from application to other uses to which it is applicable, and no alteration of this machine would be required to make it useful in mending T or other shaped rails, which have sides of different shapes from the shape of the jaws, than to make the shape of the sides of the jaws correspond with the shape of the sides of the rail. In the use of the angle-iron machine, without change of any kind, upon rails or bars of iron having straight sides, the rails or bars might or might not rest upon the anvil at the bottom, depending upon the depth of the rail or the manner in which it was clamped between the fixed and movable jaws. I am aware that in the use of this angle-iron machine for making angle-iron a tilt-hammer was used; but this I do not consider affects the comparison I am called upon to make, because it is obvious the Cawood machine would not be changed by the employment of a tilt-hammer instead of hand-sledges; neither would the angle-iron machine be changed by the use of hand-sledges instead of a tilt-hammer. I am also aware that in the use of the angle-iron machine the weight of the blow of the hammer was received by that part of the metal operated upon which rested upon the upper
665 surface of the jaws, but this is also the case in the Cawood machine, as described in the Cawood patent. When the jaws are closed together so as to grasp a T-rail as in the jaws of a vise, the part of the rail commonly called the tread or crown rests upon the jaws, and the jaws themselves take the weight of the blow of the hammer, and this is the case in the bayonet-machines also. I am also aware that in the use of the angle-iron machine for making angle-iron, that part of the metal which lays on top of the jaws will spread laterally under the blow of the hammer, but this is also the case in the Cawood machine when hand-sledges or any other hammer is used; and in that machine the shape of the upper part of the rail, after the patch is welded on, has to be re-formed by a swedge of the proper form, and also cut off by the swedge at the sides, this swedge being no part of the Cawood machine, as described in the Cawood patent. For the reasons I have given, I consider that the so-called angle-iron machine is substantially the same machine, and produces substantially the same results, by substantially the same means described in the Cawood patent. I may add to this answer that, in giving the answer, I have been aware that in the description of the Cawood patent, which purports to describe the way the patentee usually makes his machines, he states that he makes the

fixed and movable jaws nearly as high as the top of the rail which is to be mended in the machine; but I do not regard this as material, because he does not, in express terms, exclude from the machine jaws which are not nearly as high as the top of the rail to be mended, nor does he exclude by such express language jaws which are as high as the top of the rail or higher; or, in other words, I do not consider this material, because he does not specify as his invention a relative arrange-
666 ment of jaws of a holding-machine to the top of a rail or other article to be held in that machine. If such qualifications were material, I should still say there was no substantial difference between the two machines I am requested to compare, because no one could tell whether such difference existed unless a definite height of rail were given in the Cawood patent, (which is not the case,) and because the rail is no part of the machine. It would be ridiculous, in my estimation, to make the substantial identity of two machines depend upon the width, breadth, or depth of an article which they are to hold, which article forms no part of the machine, and is known to be of variable sizes.

Q. 17. Having reference to the bayonet-machine represented by the iron machine now present, and to such a machine as is represented by Defendants' Exhibit A 3, state whether or not you find the bayonet-machine substantially the same as the machine described and specified in the Cawood patent as his invention, and give your reasons for any conclusions which you may express.

A. I consider the bayonet-machine, as represented by the iron machine and the model, Defendants' Exhibit A 3, referred to in the question, substantially the same as the machine described in the Cawood patent, for the reasons I have given in making the comparison between the bayonet-machine and the machine in the Cawood patent, in my answer to a previous question (No. 13) in this examination.

Q. 18. Compare the parts severally, the combination of parts, and the mode of operation of the Church machine for holding bars, represented by model marked "Defendants' Exhibit, Church Machine No. 1," with the corresponding parts, combination of parts, and mode of operation of the machine described in the Cawood patent, and then state
667 whether the two machines are substantially the same or substantially different.

A. The Church machine represented and described in the Church patent at figs. 12 and 13, and the parts of the descriptive matter referring thereto, is the machine the lower part of which is represented by the defendants' model Church Machine No. 1. This machine contains a horizontal bed or chunk of metal corresponding with the anvil of the Cawood machine. It also contains a fixed jaw of metal which rises from the anvil or bed and is attached to the anvil by the block which holds the anvil and to which the anvil is attached. This fixed jaw is formed of the shape of the side of a rail, the rail being a double-headed rail, nearly of the form of the T rail shown in the drawings of the Cawood patent. There is also a movable jaw combined with the anvil or bed and held on to it by grooves and slides in the frame attached to the anvil, so that it moves over the face of the anvil towards the fixed jaw. The movable jaw or press-block has its surface formed to fit the side of the rail, as described in the Cawood patent, and is moved towards the fixed jaw by a series of toggle-joints connected by a connecting-rod, a similar, though not the same, mode of moving the movable jaw as the mode of moving the movable jaw described in the Cawood patent, but coming, in my opinion, within the description, because it is a convenient mode. It is a similar mode to the mode shown in the machine used by the

Illinois Central Railroad, as shown in the complainant's model of the same in evidence in this case. In the drawings, figure 13, the jaws are shown to be about as high as the top of the rail, but one of the uses of this machine being to straighten a bar when held down upon the anvil by an upper press-block, as described in the Church
668 patent, the jaws must, to correspond with the description, be a little lower than or nearly as high as the top of the rail; otherwise they could not move under the upper press-block when it was holding down the rail upon the anvil, and therefore they correspond with the Cawood description in that particular. The function of this Defendant's Exhibit Church Machine No. 1 is to hold the rail between its jaws upon and over an anvil as in the jaws of a vise, either to straighten it or for any other purpose, so that it can be operated upon by the upper press-block or hammer used with it in the machine, or by any other instrumentality that may be substituted therefor, which is the function of the jaws in the Cawood machine. Now, I am aware that there are differences of size and minor differences in mere detail of construction between this Church machine and the Cawood machine, but I do not consider these differences essential. If the Cawood machine were made as wide as the Church machine is represented, so as to hold a rail throughout its entire length, it would not substantially change the machine; neither would the Church machine be substantially changed if it were made as narrow as the Cawood machine, so as to hold only a part of the rail. If the movable press-block in the Cawood machine were combined with the anvil by means of slides, or in any other convenient manner, so as to move over the anvil towards the fixed block, it would still be substantially the same machine, although the slides were not fixed to the face of the anvil, or to the anvil, and were fixed or attached to a frame connected with the anvil. In the Cawood machine the cheeks or side frames which hold the shaft on which the cams are placed to move the movable block are apparently attached to the side of the anvil as described and shown in the patent, and in the Church machine the cheeks or frames which
669 hold the toggle-joint mechanism by which the movable joint is moved are also attached to the anvil or bed which holds the anvil. I can see no difference between the Church machine, or that part of it represented by Defendant's Exhibit Church Machine No. 1, and the Cawood machine, except in the width of the machine and the minor differences which I have stated, none of which I consider substantial.

Q. 19. What has the Church machine, marked "Defendants' Exhibit Church Machine No. 1 A," to do with the holding-machine marked "Defendants' Exhibit Church Machine No. 1," if anything, more than the sledge-hammers have to do with the Cawood machine?

A. It does all that the sledge-hammers do when used with the Cawood machine, because it hammers upon the rail when held between the jaws of the lower part of the machine; and it does more than the sledge-hammers do in the Cawood machine, because it may be used as a press-block to hold down the rail upon the anvil while the movable jaw is being pressed up against it to straighten it. This would be the case also in the Cawood machine if a hammer or press block operated by steam were placed over the jaws of the Cawood machine, and would not affect the Cawood machine, except so far as it was a combination with it of an additional member.

Q. 20. Do you find any description in the Cawood patent of the use of the metal below the opening of the jaw to support the rail against the blow of the hammer?

A. No, I do not. The description states that the rail is enclosed

between the two press-blocks as in the jaws of a vise, by which I understand the construction is to be such as to hold the rail by the gripe of the jaws against the blow of the hammer.

670 Q. 21. Do you find anything in the patent indicating that Cawood had any intention of so using the metal which is below the opening of the jaws, or that he had any idea of limiting his patent to such use of that metal?

A. No, I do not; and for the reasons stated in my last answer.

Q. 22. What kinds of movable press-blocks do you understand to be included within the description of the Cawood patent?

A. A press-block to hold a bar between it, and another press-block, as in the jaws of a vise, having jaws shaped to fit the article held.

Q. 23. What kinds of fixed press-blocks do you understand to be included within the description of the Cawood patent?

A. A press-block, fixed with reference to the movable block, so as to hold the bar between it and the movable block as in the jaws of a vise, having jaws to fit the article held. It may or may not be cast with the anvil or chunk of metal to which it is attached, and it may not be attached to said chunk of metal at all, except by being held by some convenient device, so as to resist the pressure of the movable press-block.

Q. 24. In what manner and by what means may the two clamping-jaws be combined and operated within the description of the Cawood patent?

A. By any means which will secure a sufficient mass of metal to hold the bar properly against the blow of the hammers, and in any convenient manner.

Q. 25. State what function is by the description of the Cawood patent ascribed to the metal immediately below the opening between the jaws.

A. I do not find any function described in the said Cawood patent as being performed by the said metal.

671 Q. 26. What can you say respecting the specification of Cawood furnishing any known limitation to the shape of the face of the clamping-jaws?

A. I don't know of any limitation in the Cawood specification as to the shape of the clamping-jaws or press-blocks.

Q. 27. Give us some idea how many forms of railroad bars you have known of, and what are the forms of some of them.

A. Of the different forms of railroad bars that I have known of I cannot pretend to give the number; varieties are so great. There are a number of different forms of T rails, of H rails, of double-headed rails, of angle-iron rails, of square and rectangular bar-rails, of U rails, of Y rails, and of Z rails, and varieties which are crosses between these different varieties. I have seen also fish-bellied rails in use upon the Eastern Railroad in Massachusetts, in which the rail bellies down between the ties, the bottom of the rail being bow-shaped instead of straight, as in some other forms of rails. If the Cawood machine were to be made to fit the side of this rail, the jaws would have to have such a configuration to fit the rail as would not admit of any part of the rail being placed between the jaws except the part the jaws were made to fit, on account of the bow shape of the rail. I produce models of angle-iron rails, one of which, marked "Defendants' Exhibit De Bergue angle-iron rail," I find described and shown in the English patent dated Feb. 7, 1851, numbered 13493, granted to De Bergue. The drawing, fig. 1, on sheet I of said patent, represents this rail. The other, marked

Illinois Central Railroad, as shown in the complainant's model of the same in evidence in this case. In the drawings, figure 13, the jaws are shown to be about as high as the top of the rail, but one of the uses of this machine being to straighten a bar when held down upon the anvil by an upper press-block, as described in the Church
668 patent, the jaws must, to correspond with the description, be a little lower than or nearly as high as the top of the rail; otherwise they could not move under the upper press-block when it was holding down the rail upon the anvil, and therefore they correspond with the Cawood description in that particular. The function of this Defendant's Exhibit Church Machine No. 1 is to hold the rail between its jaws upon and over an anvil as in the jaws of a vise, either to straighten it or for any other purpose, so that it can be operated upon by the upper press-block or hammer used with it in the machine, or by any other instrumentality that may be substituted therefor, which is the function of the jaws in the Cawood machine. Now, I am aware that there are differences of size and minor differences in mere detail of construction between this Church machine and the Cawood machine, but I do not consider these differences essential. If the Cawood machine were made as wide as the Church machine is represented, so as to hold a rail throughout its entire length, it would not substantially change the machine; neither would the Church machine be substantially changed if it were made as narrow as the Cawood machine, so as to hold only a part of the rail. If the movable press-block in the Cawood machine were combined with the anvil by means of slides, or in any other convenient manner, so as to move over the anvil towards the fixed block, it would still be substantially the same machine, although the slides were not fixed to the face of the anvil, or to the anvil, and were fixed or attached to a frame connected with the anvil. In the Cawood machine the cheeks or side frames which hold the shaft on which the cams are placed to move the movable block are apparently attached to the side of the anvil as described and shown in the patent, and in the Church machine the cheeks or frames which
669 hold the toggle-joint mechanism by which the movable joint is moved are also attached to the anvil or bed which holds the anvil. I can see no difference between the Church machine, or that part of it represented by Defendant's Exhibit Church Machine No. 1, and the Cawood machine, except in the width of the machine and the minor differences which I have stated, none of which I consider substantial.

Q. 19. What has the Church machine, marked "Defendants' Exhibit Church Machine No. 1 A," to do with the holding-machine marked "Defendants' Exhibit Church Machine No. 1," if anything, more than the sledge-hammers have to do with the Cawood machine?

A. It does all that the sledge-hammers do when used with the Cawood machine, because it hammers upon the rail when held between the jaws of the lower part of the machine; and it does more than the sledge-hammers do in the Cawood machine, because it may be used as a press-block to hold down the rail upon the anvil while the movable jaw is being pressed up against it to straighten it. This would be the case also in the Cawood machine if a hammer or press block operated by steam were placed over the jaws of the Cawood machine, and would not affect the Cawood machine, except so far as it was a combination with it of an additional member.

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Q. 24. In what manner and by what means may the two clamping-jaws be combined and operated within the description of the Cawood patent?

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Q. 27. Give us some idea how many forms of railroad bars you have known of, and what are the forms of some of them.

A. Of the different forms of railroad bars that I have known of I cannot pretend to give the number; varieties are so great. There are a number of different forms of T rails, of H rails, of double-headed rails, of angle-iron rails, of square and rectangular bar-rails, of U rails, of Y rails, and of Z rails, and varieties which are crosses between these different varieties. I have seen also fish-bellied rails in use upon the Eastern Railroad in Massachusetts, in which the rail bellies down between the ties, the bottom of the rail being bow-shaped instead of straight, as in some other forms of rails. If the Cawood machine were to be made to fit the side of this rail, the jaws would have to have such a configuration to fit the rail as would not admit of any part of the rail being placed between the jaws except the part the jaws were made to fit, on account of the bow shape of the rail. I produce models of angle-iron rails, one of which, marked "Defendants' Exhibit De Bergue angle-iron rail," I find described and shown in the English patent dated Feb. 7, 1851, numbered 13493, granted to De Bergue. The drawing, fig. 1, on sheet 1 of said patent, represents this rail. The other, marked

"Defendants' Exhibit Adams's angle-iron rail," I find described in the English patent granted to William Bridges Adams, dated June
672 3, 1851, and numbered 13653, the drawing representing the rail being 7 A, sheet I. Printed official copies of these English patents are to be found in the Astor Library, in Lafayette Place, in this city.

Q. 28. Is the bayonet which accompanies the complainant's iron bayonet-machine a proper bayonet for that machine?

A. It is not. In my judgment it could not have been welded in that machine, because the socket of that bayonet, which is the part to be welded in that machine, is smaller than the socket-die which is formed in that machine when the jaws are closed, and I have no doubt the socket of the bayonet was welded in a machine with smaller dies in the jaws.

Q. 29. Can you produce a bayonet capable of being welded in that machine, "Complainant's iron bayonet machine?" If so, identify it.

A. There is here present a bayonet-socket with part of the blade and a mandrel suitable for it, marked "Defendants' exhibit, bayonet-socket and mandrel, J. G., jr.," which is of the proper size to be welded in that machine.

F. C. TREADWELL, JR.

Sworn to before me this 15th day of October, 1869.

JOSEPH GUTMAN, JR.,
Examiner, etc.

Adjourned to Saturday, 16th of October, 1869, at 10 a. m., for cross-examination.

673 N. Y., *Oct.* 16, 1869, at 10 a. m.

Present: Complainant in person and counsel for defendants as before.

Cross-examination of the witness Treadwell waived by complainant.

HENRY B. RENWICK, a witness of lawful age, produced on the part of the defendants, having been first duly cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter in controversy herein, and being examined, deposes and says as follows:

Q. 1. What is your name, age, residence, and profession?

A. My name is Henry B. Renwick. I am 52 years of age. I reside in the city of New York. I am by profession a civil and mechanical engineer.

Q. 2. Have you read, and do you understand the contents of the letters-patent to Joseph D. Cawood on which these suits are brought?

A. I have read the patent, and believe that I understand its contents.

Q. 3. Have you heretofore, and if so, when and where, been examined as a witness on this patent?

A. I was examined in a case tried at Detroit in the summer of 1862.

Q. 4. Have you examined, and do you understand a printed copy of the English letters-patent to William Church, dated the 5th day of May, 1846?

A. I have frequently examined the printed copy of that patent, and believe that I understand the same.

Q. 5. Look at complainant's model marked "Church machine," and state whether it is a fair representation of any part of the Church patent, and give your reasons.

674 A. It is in almost all respects a fair model of the machine described at figures 31 to 35 inclusive. In some respects I do not consider it a fair model. In the model that part of the lower die on which the rail rests is shown as below the opening in the frame-work of the machine, being in that respect like figure 35, thereby necessitating the lifting of the rail in order to remove it endwise, while the machine, from its arrangement, affords but poor facilities for raising the rail. A comparison of drawings, figures 32 and 34, and a measurement thereof show that the bottom of the die is above the bottom of the opening of the frame, under which construction it would be perfectly easy to remove the rail endwise, which is the only way described in the patent of getting rails or other articles out of any of the machines. Further, the model does not show any connecting-rods between the piston-rods of the engines and the long rods connecting the toggles. The machine could not possibly be operated without such connecting-rods. Further, on drawing figure 35, the slot through which the connecting-rod passes is represented as only as wide as the connecting-rod. This is evidently an error inconsistent with all the other drawings and descriptions. This error has been remedied in the model to a certain extent, but only to such an extent as will permit the slings, G G, to raise a little more than half-way above the height of the rail. If the slot were as open as it should be, and the error of drawing fig. 35 had been fairly corrected, the connecting-rod could have been lifted higher, and the slings could have been raised above the top of the rail, which could then have been introduced and removed without difficulty or turning through the opening in the frame of the machine.

Q. 6. Look at the model marked "Defendants' Church Machine No. 1," and state what it represents.

675 A. It represents a portion of the machine shown in figures 12 and 13 of sheet 3 of the drawing exactly, with the exception that handles have been attached to the rod which connects the toggle, so that it may be worked by hand, and that a joint in the rod to which the handle is attached is not shown. The dies fitting the sides of the rail are, as near as I can judge by eye, of the exact form of those represented in the drawings, but this latter point is not essential, as the patent expressly states on page 6 that the faces of the dies must be made to suit the surfaces of the articles to be operated upon, and therefore changed for every different form of bar or other article intended to be straightened or flattened in the machine. The essential parts represented in this model are a bottom piece on which the rails and other articles rest, a stationary side jaw, conformed to one side of the article to be operated on, and a movable side jaw conformed to the other side of the same article, such movable jaw being caused to approach the other jaw by means of toggles, and to recede by means of springs, and the jaws and bottom being of such form as to inclose and fit the article on the sides and the bottom thereof.

Q. 7. What can you say as to the function of the Cawood machine being anything more than to hold the bar while being acted upon by some other instrumentality?

A. It has no other function than to hold the bar and preserve the shape of that portion thereof which lies below the top of the jaw while being acted on by some other instrumentality.

Q. 8. What can you say as to the functions of such a machine as is represented by "Defendants' Exhibit Church Machine No. 1," compared with that of the Cawood machine?

676 A. It has precisely the same function when the movable jaw

is held pressed up by the steam-engine which the patent describes as acting thereon.

Q. 9. Look at the model marked "Defendants' Exhibit Church Machine No. 1 A," and state where it is and to what it belongs.

A. It is a fair representation of the steam-hammer or press-block forming part of the machine shown in figures 12 and 13. The joint on the rod connecting the toggles is not shown, and a handle has been attached, as in model No. 1, in place of the steam-engine, not represented in the model, but referred to in the description, and it belongs to model No. 1, being a part of the whole machine represented by drawings, figures 12 and 13.

Q. 10. Look at model marked "Defendants' Exhibit Church Machine No. 2," and state what it is and what is its function.

A. It is a model of the bottom piece and movable jaws, toggles, springs, and frames and parts connecting the same, of the machine represented in figures 31 to 35 included, of the Church patent. It does not show the steam-engine and its connections with the toggles, nor the lever-beams, nor the slings and their lifting-rods and levers, but it is a fair representation of all the other parts, although one of the toggles is reversed, and although the frame at the ends of the die is cut away lower than is shown in the drawings. The toggles operate upon the movable side jaw in the same way whether they be arranged as shown in the drawing or with the position of one set reversed, and it is no matter how low the opening in the frame extends, reference being had either to the construction or operation of the machine, so long as it is not above the bottom of the lower die, and this, as I have before stated, is, in my opinion, the construction called for by reference to the drawing
677 and description of Church as a whole. The dies in the model are not shaped exactly as those represented in the drawing model, figure 34, composed of four pieces, showing in pieces marked by me "H, I, and A, Joseph Gutman, jr.," as near as I can judge by eye, what should be the precise configuration of the side dies and bottom piece of model Church machine No. 2, if made in exact conformity with the drawing. The functions of the two movable jaws and the bottom piece are to hold and preserve the shape of the article compressed between them as far up as the line marked by me H. B. R. on H. and I., just below the top of the rail, while the rail so held and preserved in shape has the exposed portion thereof operated upon, the acting part of the side dies to preserve shape extending only as high as that line.

Q. 11. Look at model marked "Defendants' Exhibit, Church Machine, No. 2 A." State what it is and where it belongs.

A. It is the steam-hammer or press-block, with the die attached, shown in Figures 31 to 35, inclusive, in the Church drawing, but it has no representation of the steam-engine and its connection with the toggle-rod, nor of the slings and the rods and levers which lift and lower them. The opening in the frame is higher than the precise opening represented in the model; but as that opening in the drawing, Figs. 32 and 34, is shown higher than the top of the rail, so as to admit of free removal endwise, it is immaterial whether the opening be a little higher than that point or not. The die attached to the hammer is, as near as I can see by eye, of the correct shape, and so is the piece marked "K, Joseph Gutman, jr." It belongs on top of model "Defendants' Exhibit, Church Machine, No. 2."

Q. 12. Look at model marked "Defendants' Exhibit, Slide Vise," and state what it is, and how long you have known such a tool.

678 A. It is an ordinary parallel vise, with an unprotected screw

to operate the movable jaw. I have known of a vise exactly like that for thirty years, I should say, and of vises with similar jaws, but other means for operating the sliding jaw, certainly prior to 1849. Some of these vises have a bottom attached to the stationary jaw about in the position of the screw—of that portion of the screw of this vise which lies between the jaw and the operating mechanism—is entirely on that side of the movable jaw farthest from the stationary one. This bottom, as far as my memory serves me, is not quite as wide as the jaws, and the jaws are about the shape of that part of the jaws in "Exhibit, Slide-Vise," which is above the ball on the screw. There are other forms of parallel vises in which the screw is covered by a bottom, the bottom being the top of a piece which incases and protects the screw; but I cannot fix with precision the earliest time at which I saw such vises, though I am pretty certain that it was prior to 1852.

Q. 13. Look at model marked "Defendants' Exhibit, Michigan Southern," and compare such a machine as it represents with the old bayonet-machine and with the Cawood machine.

A. "Defendants' model, Michigan Southern," has a stationary and moving jaw, much like those of the old blacksmiths' vise known to me since my boyhood, between the jaws of which articles were clamped, and sledged or otherwise acted upon. The jaws are much wider in proportion to their length than those of the old vise, and the movable jaw is operated to grasp articles by means of a lever and friction-rollers instead of a screw. The jaws, moreover, of this exhibit are so shaped that when they touch each other at certain points they leave between them an open space, which is the counterpart of the sides and
679 bottom of the article to be acted upon up nearly to the top thereof, the article being evidently in this case a common H, generally but improperly called a T-rail. When such an article is enclosed between the vise jaws of "Defendants' Exhibit, Michican Southern," it will be clamped fast, and supported and preserved from change of form in those parts below the tops of the jaws, while that part which is above the tops of the jaws may be acted upon without having its form preserved. The bayonet-machine iron model, and the other bayonet-machines, model "C. E. M., U. S. Commissioner," and "D. E. M., U. S. Commissioner," and "XXX, J. G. jr., U. S. Commissioner," all have one fast and one moving jaw. All have means for guiding one jaw towards the other. All have levers and rollers for causing the movable jaw to approach, and are all heavy and massive enough to withstand the blows of a hammer or sledge, and all have their jaws cut out so as to support the article being operated upon so shaped that when they touch each other they leave between them an open space which is the counterpart of the sides and bottom of the article to be acted upon nearly to the top thereof. These jaws in all the bayonet-machines prevent change in shape in that part of the article enclosed between them which lies below the top of the jaws, while that part above the top may be acted upon without preserving its form. In all these respects, both in construction and mode of operation, (and by these respects I mean to include the whole mode of construction and operation of the bayonet-machines,) they are identical with the Michigan Southern machine, there being between the various bayonet and the Michigan Southern machine the same formal difference, viz: That the jaws are so shaped as partially to enclose different shaped articles, both jaws, however, in each
680 and every case, leaving when they touch each other at certain points a space existing between them which will exactly enclose

that part of the article to be operated upon which it is desired to enclose and protect.

The Cawood machine, as specially represented in the drawings of the patent, has a mass of metal upon which the bottom of the article to be acted upon may rest with one jaw made in one piece therewith, and another movable jaw, properly guided and moved towards the other jaw by means of cans. The description is, that the two jaws are to be counterparts of the two sides of the rail, nearly as high as the top of the rail; and, further, that the movable press-block or jaw may be operated in any other convenient manner than that specially described, so as to enclose the rail between the fast and movable jaws as in the jaws of a vise. This machine is, I think, substantially the same in all respects, both in construction and operation, as the Michigan Southern and the bayonet-machines. It is true that under the precise construction described in the Cawood patent that no part of the movable jaw ever touches the stationary one, but that the proper recess for a portion of the rail is left while they are still apart, but this is a formal difference, as it makes no difference either in construction or mode of operation whether that portion of iron which lies under the bottom of the rail be wholly attached to one jaw or whether part thereof be attached to each jaw or whether it be attached to neither jaw, and both jaws slide upon it. This statement of mine can be further explained by reference to the model marked "Beebe & Smith, patent, June 9, 1857," the jaws of which separate and approach each other in arcs of a circle or nearly so, like common vise jaws, and in these jaws one-half of that portion of the iron which lies under the bottom of the rail is attached to and moves
681 with each jaw, as in the Michigan Southern machine. The Beebe & Smith machine is, in all respects, in my opinion, substantially identical with Cawood's description, and has the same peculiarity as the bayonet and the Michican Southern machines, in the fact that the jaws do touch each other in the operation of the machine, and that when they do so touch they leave between them a space partly cut out of each jaw, which will fit the article to be acted upon, except that part thereof which sticks above the tops of the jaws.

In all these machines referred to in this answer, if a piece of heated metal is enclosed and hammered by a sledge, trip, or hand hammer, that part thereof which projects above the top of the jaws is free to expand laterally, or "squash out," as it is sometimes called, so that if a hot rail were placed in either the Cawood or the Michigan Southern machine and hammered upon, the shape of that part thereof above the jaws would be destroyed. In model XXX, there is a trip-hammer represented, with which the top of the article enclosed between the jaws may be acted upon, but this hammer does not modify in any respect the rule of construction or mode of operation of the parts which I have before described, and if an ordinary steam or other mechanical hammer were bolted to the Cawood or Michigan Southern machine, so as to operate upon the exposed parts of articles enclosed in the jaws, both these machines would have the same rule of construction and the same mode of operation as when the article between them was acted upon by hand-hammers, sledges, or other tools. Such a steam-hammer would be an addition to the machine, not an alteration of the parts already existing or the functions of those parts.

Q. 14. Look at the model marked "X, E. A. D.," and state what it represents.

682 A. It represents a machine which I heard described at the trial in Detroit, before referred to by me, and which was called the angle-iron machine.

Q. 15. Look at model marked "Y, E. A. D.," and state what it represents.

A. It represents one-half of exhibit X, E. A. D., with the shape of the acting parts of the stationary and movable jaws changed in form so as to conform to the sides of a T-rail nearly to the top thereof, and the machine has added to it a swedge-block similar to that represented in the drawings of Cawood's patent.

Q. 16. Compare the parts severally, the means of combining them, and the mode of operation in the angle-iron machine with the corresponding parts, means of combining them, and the mode of operation in the Cawood machine, and then state whether the machine as described and specified in the Cawood patent is substantially different from or substantially the same as the angle-iron machine.

A. In the angle-iron machine there is a solid block with one jaw attached thereto. There is another jaw movable, sliding on the block, forced towards the other jaw by a cam and sufficiently guided by a prolongation of the jaw, which slides between two cheek pieces attached to the block. The Cawood machine, as described in the patent, is described as useful for mending the ends of railroad-rails, of T or other shapes, and the direction is that the sides of the movable and stationary jaws nearest each other should be shaped to the side of the rail and extend nearly as high as the sides of the rail. There is no limit to this extension of height of the jaws except the height of the rail.

Prior to the date of Cawood's patent, angle-iron rails were well known, first as tram-rails, in which the wheel ran on the face marked "Wheel, H. B. R.," in defendants' exhibit De Bergue; and, second, as edge
683 rails in which the tread of the wheel ran upon the face marked "Edge, H. B. R.," on the same exhibit and in the same way on defendant's exhibit Adams. The use of angle iron as a tram-rail is described in various of the early books on railways. The use of angle-iron as an edge rail is, I know, described in a printed copy of De Bergue's English patent, No. 13493, and Adams' patent, No. 13653, both for the year 1851. If I desired to make a machine in accordance with the description of Cawood's patent to mend exfoliated tram-rails I would make the sides of his stationary and movable jaws plain surfaces, and lay the rail down between them with the part marked De Bergue uppermost; then clamp up the jaws and proceed to patch the exfoliated parts of the rail. If I wished to patch an angle-iron rail, used as an edge rail, and having a fillet, as in exhibit De Bergue, I would construct the jaws of Cawood's machine, following his description exactly, like the fast and movable jaws of the angle iron machine, and if I wished to mend a rail like the angle-iron rail of Adams I would make the jaws in the same shape, with the exception of the bevel at the top of the stationary jaw. I, therefore, following the directions of the patent, would, in order to hold and mend angle-iron rails, make a machine identical in all respects with the angle-iron machine. In mending a T-rail in the Cawood machine the face of the anvil, as contrasted with the whole mass which forms the anvil, are those portions of the cheeks which expand outwardly as they rise above the neck of the rail. The patch above the cheeks is free to spread or expand laterally, and may, by improper management, be reduced to a sheet. In Cawood's machine, made to mend an angle iron rail, which is the angle-iron machine, that part of the iron above the jaws is free to expand
laterally to just the same and to no greater extent than that
684 part of the T-rail which lies above the jaws, and in the angle-iron machine that part of the stationary jaw, both beveled

and horizontal, which underlies the rail, is the real anvil-face, just as the same part is the same face when the machine is so formed that a T rail may be mended in it. In the angle-iron machine, and a machine made for mending angle-iron rails according to the directions of the Cawood patent, the shapes of the fillet of a hot rail, and of all parts below it, would be preserved by the jaws while the top is being acted upon, and the same is true of the Cawood machine, with jaws so formed as to embrace a T-rail, for in that case the jaws preserve the shape of the two fillets which make the connection between the neck and the head of the rail. In mending the rail with the angle-iron machine care would have to be taken to preserve the shape of that part thereof above the jaws, and precisely the same care would have to be taken in preserving the shape of the portion of a T-rail exposed above the jaws in a Cawood machine, and in mending either form of rail, swedges or similar contrivances would have to be resorted to to restore the shape of that part of the rail which lies above the jaws. That part of the angle-iron which lies above the jaws is no more liable to lateral spreading than that part of the T-iron which lies above the jaws. Such being my opinion of the construction and operation of the various parts of the angel-iron machine, and of a machine constructed in exact accordance with the directions and specifications of the Cawood patent, I conclude that the two machines are substantially identical as entireties, and also in the construction, means of combining, and modes of operation of the several corresponding parts.

Q. 17. Having reference to the bayonet-machine (the iron ma-
685 chine now present) and to such a machine as is represented by defendants' Exhibit A 3, state whether or not you find the bayonet-machine substantially the same as the machine described and specified in the Cawood patent as his invention, and give your reasons for any conclusion you may express.

A. I find the bayonet-machine substantially the same as the machine described in the Cawood patent. and having already at some length given my reasons for that conclusion, I think it unnecessary to repeat them.

Q. 18. Compare the parts severally, the combination of parts, and the mode of operation of the Church machine for holding bars, represented by model marked "Defendants' Exhibit Church Machine No. 1," and the corresponding parts, combination of parts, and mode of operation of the machine described in the Cawood patent, and then state whether the two machines are substantially the same or substantially different.

A. In the machine represented by model No. 1, made in accordance with the directions of the Church patent, the shape of the acting sides of the stationary and movable jaws may be varied so as to suit the form of the rail, or other article which is placed between them. The stationary and movable jaws of this machine are therefore identical with the stationary and movable jaws described in the Cawood patent, both in construction and in mode of operation, as before more than once defined, and also in their combination with the piece which underlies the rail, except in one respect, viz, that they are as high as the top of the rail, instead of being only nearly as high as the rail, which is the description of the Cawood patent. The stationary and movable jaws and bottom surround and support the rail exactly in the same way as
686 the corresponding parts of the Cawood patent. They hold it in the same way to be operated upon on the top, but they differ in degree from the Cawood patent, in the fact that the whole side surface of the rail would be preserved in shape under exposure to vertical blows

in the Church machine. If a T-rail were the article to be held and the machine were to be used to patch such a rail, this peculiarity of the stationary and movable jaw would be disadvantageous in so far as it would, I think, lengthen the time necessary for patching rails, although I believe that T-rails might be patched by the use of the machine represented by model "Defendants' Exhibit Church Machine No. 1." If the dies of the machine represented by model "Defendants' Exhibit Church Machine No. 1," were made to fit either of the rails as represented in "Exhibit H. B. R., No. 52," and if they were so made, they would still be within Church's description, for both these forms of rail were known previous to his patent, then the stationary and movable jaws would still support the rail in the same way as it is supported in the Cawood machine, and the fact that they are as high as the top of the rail would facilitate instead of impeding the operation of patching. If the Cawood machine were made for such rails as the paper "Exhibit H. B. R., No. 52," the side dies might be shaped in exact accordance with his description, and just as the dies are in the paper exhibit, except that they would not rise quite to the top of the rail, and they would then act just as the dies of the exhibit. Taking into consideration the modifications described both by Cawood and by Church, and the fact that the machine of either is the same machine, so long as built within these modifications, it is my opinion that there is no substantial difference between the machine represented by "Defendants' Exhibit Church Machine No. 1," and the Cawood machine.

687 Q. 19. Compare the parts severally, the combination of parts, and the mode of operation of the Church machine for holding bars represented by model marked "Defendants' Exhibit Church Machine No. 2," and the corresponding parts, combination of parts, and mode of operation of the machine described in the Cawood patent, and then state whether the two machines are substantially the same, or substantially different.

A. A machine represented by defendants' exhibit "Church Machine No. 2," would differ from the one represented by No. 1 in two respects only; one of these differences is, that both side jaws are movable instead of one only, as in the Cawood machine. I have already stated in substance that this difference is merely formal, having said that a machine built like the model marked "Beebee & Smith," which has two movable jaws, would come within the description and specification of the Cawood patent. The other difference between defendants' exhibit "Church Machine No. 1 and No. 2," is to be found in the fact that the acting part of the side dies of No. 2 do not reach to the top of the rail, and therefore come within the description of the Cawood patent that the jaws should be "nearly as high as the rail." On Exhibit 34 I have marked a line showing the acting height of the jaws. If a rail were patched between such jaws, (which could certainly be done by using a patch as wide at bottom as at the top of the part of the rail which is to be patched, and narrow at the top,) the iron of the patch would be free to spread along the inclined sides of the jaws, which are above its acting surface, just as it would spread over the horizontal tops of the jaws of the Cawood machine in patching a T-rail. The jaws of Church and those of Cawood both preserve the shape of the patch or of the rail,

688 as high as the tops of their acting surfaces and no further, and both permit spreading of the rail, and patch over such portions of the jaws as are not active in compressing and supporting the rail. A fin, the result of patching, would take place when either Church or Cawood was used, and this fin would have to be cut off, and the part

above the acting parts of the dies be brought into shape afterwards in both cases. I am of the opinion that a machine made in accordance with the description of Church like No. 2, is in all its parts, in their combination and mode of operation, and as a whole, substantially identical with the machine described in the Cawood patent.

Q. 20. What has the Church machine marked "Defendants' Exhibit Church Machine No. 1 A" and "No. 2 A" to do with the holding machine marked "Defendants' Exhibit Church Machine No. 1 and No. 2," if anything, more than the sledge-hammers have to do with the Cawood machine?

A. They have nothing more to do with them.

Q. 21. Do you find any description in the Cawood patent of the use of the metal below the opening of the jaws to support the rail against the blow of the hammer?

A. I do not.

Q. 22. Do you find anything in the patent indicating that Cawood had any intention of so using the metal which is below the opening of the jaws, or that he had any idea of limiting his patent to such use of that metal?

A. I find no indication of any such intention, and do not think that the patent is limited to such a use of that surface of metal.

Q. 23. What kinds of movable press-blocks do you understand to be included within the description of the Cawood patent?

689 A. Any kinds of movable press blocks, so long as they are nearly as high as the rail and fit one side thereof, the contour not being limited to a shape the counterpart of any one form of rail, but the block being within the description of the patent if fitting nearly to the top, any one of the multitude of forms of rails.

Q. 24. What kinds of fixed press-blocks do you understand to be included within the description of the Cawood patent?

A. Any kind of fixed press-blocks substantially within the directions of the patent which will cause it to be shaped on its inner and acting surface, substantially as I have described the movable press-block.

Q. 25. In what manner and by what means may the two clamping-jaws be combined and operated within the description of the Cawood patent?

A. They may be combined in any manner, and by any means, substantially identical with those specially described in the patent, and operated by any substantial equivalent of the cams and their shaft and handles.

Q. 26. State what function is, by the description of the Cawood patent, ascribed to the metal immediately below the opening between the jaws.

A. No function except as a base or starting point, from which to measure the height of the jaw in constructing the machine.

Q. 27. What can you say respecting the specification of Cawood furnishing any known limitation to the shape of the face of the clamping jaws?

A. There is no limitation to their shape, so long as they are counterparts of anything which may be used as a rail.

690 Q. 28. Give us some idea how many forms of railroad-bars you have known of, and what are the forms of some of them.

A. I certainly have known of several hundred forms of railroad-bars; among them are the strap-rail, the rail with a quadrangular section beveled on the upper corners, various forms of angle-iron rails, Y-rails, Z-rails, U-rails, and H-rails; also many forms of compound rails, hollow

rails, and double-headed rails. There are also other forms of rails that I know that I do not deem it necessary to refer to.

Q. 29. Is the bayonet which accompanies the "Complainant's Iron Bayonet Machine" a perfect bayonet for that machine? (H. B. R., No. 53.)

A. It is not a perfect bayonet for that machine, it being evident, from trying it in that machine, that it was made upon a machine the cavities in the jaws of which were smaller than those of the iron machine.

Q. 30. Examine "Defendants' Exhibit Bayonet-socket and Mandrel, J. G., jr.," and say whether it is capable of being welded in that machine—"Complainant's Iron Bayonet Machine."

A. I have examined it, and it is capable of being welded in that machine. I have fitted the exhibit in the machine.

HENRY B. RENWICK.

Subscribed and sworn to before me this 16th day of Oct., 1869.

JOSEPH GUTMAN, JR.,
Examiner, &c.

Adjourned to October 18th, 1869, at 9 a. m.

691 N. Y., *Oct.* 18, 1869.

Present, complainant in person, and Mr. Whipple, of counsel for defendants.

WILLIAM C. HIBBARD, a witness of lawful age, produced on the part of the defendants, having been first duly cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter in controversy herein, and being examined, deposes and says as follows:

Q. 1. What is your name, age, residence, and profession?

A. My name is William C. Hibbard; age 55 years. I reside at West Roxbury, Massachusetts. My profession is that of mechanical engineer, and I also act as an expert in mechanics in the trial of patent suits.

Q. 2. Have you read and do you understand the contents of the letters-patent to Joseph D. Cawood on which these suits are brought?

A. I have examined said patent, or copies thereof, and believe that I fully understand the same, and the principle and mode of operation of the mechanism therein described.

Q. 3. Have you heretofore, and, if so, when and where, been examined as a witness on this patent?

A. I have been heretofore examined in relation to this patent, first at a trial that took place in Detroit, Michigan, several years since. I have no means at hand to fix the date, but understood that it was the second trial of the same case in that court. I was also examined in relation to the same subject-matter at a trial at Chicago, Illinois, some two years after, as well as I recollect, which was tried before Judges Davis and Drummond without a jury.

692 Q. 4. Have you examined and do you understand a printed copy of the English letters-patent to William Church, dated the 5th day of May, 1846?

A. I have examined it, and believe that I understand it.

Q. 5. Look at complainant's model marked "Church machine," and state whether it is a fair representation of any part of the Church patent, and give your reasons.

A. I have examined the model mentioned, and think it is generally a fair representation of one form of the machine described in the Church

patent, with the exception of some minor details of construction in relation to some of the subordinate parts, as, for instance, the absence of a joint between the connecting-rod and the piston which works the toggle-joints, to apply the pressure by the dies; also a difference in the construction of the springs; also that the bed-die is arranged a little too low in relation to the opening through the frame at the end of the die. But the construction I think fairly represents the machine so far as to explain its principle and mode of operation. There are also some other minor discrepancies, but they do not, in my judgment, materially affect the character of the machine.

Q. 6. Look at the model marked "Defendants' Church Machine, No. 1," and state what it represents.

A. It represents the lower part of another form of the Church machine described in the patent, so far as the arrangement of the bed and side dies are concerned and the manner in which they operate to form and hold the object which is submitted to their action, in any of the various operations which the machine is adapted to perform, and some of which are enumerated in the patent. In this model, also, there are some departures from the exact form described in the patent, but none, I
693 think, which materially affect its operation. The steam-cylinders, by which the power was to be applied to the machine, and its connection with the other mechanism, and the mechanism by which the pressure was applied to the upper die, are not shown in the model.

Q. 7. What can you say as to the function of the Cawood machine being anything more than to hold the bar while being acted upon by some other instrumentality?

A. The function of the Cawood machine is to hold the bar between holding surfaces, which fit the form of the bar so that it may be acted upon upon its upper surface by hammering, and thereby prevent the bar from being distorted in shape by the hammering—that is, that part of the bar which is enclosed between the jaws; it is also a function of the machine, I think, that the jaws shall be so heavy or rest upon some support that has sufficient inertia to withstand the blows upon the rail as an anvil resists the blows of a hammer when acting upon an iron laid upon it.

Q. 8. What can you say as to the functions of such a machine as is represented by Defendants' Exhibit Church Machine No. 1 compared with that of the Cawood machine?

A. I regard the machine, Defendants' Exhibit Church Machine No. 1, as containing substantially all that there is in the Cawood machine, with some additional matter, to which there is nothing in the Cawood machine to correspond. But as regards the dies for holding objects between them, they are identical in principle with those of Cawood. The side dies are fitted to the side of the object which they are to compress between them, and are provided with means for applying that pressure very efficiently to hold the bar between them, while another instrumentality acts upon the top of the bar, while it is thus
694 firmly held. In the patent this machine is described as being adapted to the straightening or flattening bars and rods of metal, and the bar which is shown in figure 13 of the drawings is a double-headed railroad-bar, so called. Now, as in my judgment, the Cawood machine simply holds the bar under the conditions which I have mentioned in my preceding answer, while some other instrumentality distinct from the machine operates upon that part of the bar which is not enclosed, the operations of the two machines appear to me to be exactly alike. There is no doubt in my mind that the jaws between which the

bar is held in the Church machine are of sufficient strength and weight to hold the bar firmly and efficiently to receive a patch upon its upper surface, or any other operation of smith-work which the mending of rails requires, because the machine is designed to be of sufficient strength to straighten a cold rail, and was therefore abundantly strong to hold one when hot.

Q. 9. Look at the model marked "Defendants' Exhibit Church Machine No. 1 A," and state what it is and to what it belongs.

A. It appears to represent substantially that part of the Church machine last referred to which is above the side dies, and represents the manner of applying the upper die to act upon the upper surface of the rail, the power to operate which is applied by a system of toggle-joints similar to that which is employed to force the movable side die towards the stationary one.

Q. 10. Look at model marked "Defendants' Exhibit Church Machine No. 2," and state what it is and what is its function.

A. The model mentioned appears to represent substantially that form of the Church machine shown in figures 31, 32, 33, and 34 of the drawings of Church's patent with that part of the framing which car-
695 ries the upper die and its operating mechanism removed. The functions of this form of the Church machine were to form a railroad-rail by bending and swedging from a bar previously rolled to form, as is described in the patent. The form of the dies in the machine represented in the model is but one of several forms of dies which were intended to be used in the same machine at different stages of the operation in making a rail. The rail shown was of a tubular kind, or hollow, and was made by the operations, first, of bending up the plate or bar around a mandrel forming the sides and bottom of the bar, and preparing the top for welding, and when thus prepared and properly heated, the bar was to be inserted in the dies, and by the action of the top die the weld was closed, and the top of the rail was finished or swedged to form.

Q. 11. Look at a model marked "Defendants' Exhibit Church Machine No. 2 A," and state what it is and where it belongs.

A. It appears to represent substantially the upper part of the machine "Defendants' Exhibit No. 2," which is above the side dies, and which carries the upper die of the machine and its operating mechanism, excepting the steam-cylinders for operating the same, and some of the minor details of mechanism which relate to the working of the mandrel around which the rail is formed.

Q. 12. Look at model marked "Defendants' Exhibit Slide Vise," and state what it is, and how long you have known such a tool.

A. It is a model of a metal-worker's vise, known in the trade as a parallel vise. It has been in use a great many years, in nearly the same form, or rather in a variety of forms, all having the same general character.
I think I have known it thirty years, more or less. I cannot now
696 recall the first time that I ever saw such a vise, but I distinctly remember having seen them as much as thirty years ago.

Q. 13. Look at model marked "Defendants' Exhibit Michigan Southern," and compare such a machine as it represents with the old bayonet machines and with the Cawood machine.

A. The machine marked "Defendants' Exhibit Michigan Southern," and the several bayonet-machines now before me, viz. that marked "D. E. M., U. S. Comm'r," and that marked "C. E. M., U. S. Comm'r," and that marked "A 3, Springfield Armory Vise, John M. Stebbins, notary public," and the complainant's iron machine, all appear to be identical

in principle and mode of operation in that part which encloses the object to be operated upon, as in a vise, while it can be hammered upon that part of the same which is not so enclosed. In the Michigan Southern model there is a swedge-block attached to the fixed jaw of the machine for forging the sides of the rails, which is not included in the comparison. The differences between these several machines consist only in the form which is given to the face of the jaws which come in contact with the object to be held, and the weight or size of the machines, which are respectively adapted to the size of the object to which they are respectively applied. But this difference in the form of the jaws does not in the least change the essential character of the machines of which the bayonet-machines themselves are a good illustration, where the same machine is provided with several kind of dies to operate upon the bayonet in different stages of its construction, and was also applied to the construction of other parts of a gun, as was testified to by a Mr. Cooley in my presence, in the trials at Detroit and Chicago before mentioned, one of which modifications is shown in exhibit E. E. M., U. S. Comm'r, which was adapted to the forging of cocks

697 for gunlocks. Each of these machines being used in forging has the properties, first of having dies which will fit the form of the object placed in them, which are forced together with sufficient power to hold the object firmly enough to resist any tendency which the blows applied to the object to forge it would have to get it out of shape; second, to support the metal in all parts that is necessary to enable it to be forged, that is, to act as an anvil to that part which is to be changed in form by the operation of forging; and third, that the jaws shall enclose that part of the object whose form is to be preserved, and expose that part which is to receive the operation of smithing. These several machines, which I have before referred to, show that while the substantial character of the machine remains the same, the form of the dies and the objects to which the machine may be applied may be varied indefinitely at the will of the operator. The Cawood machine appears to me to be a machine of precisely the same character in every respect, and although the mechanical construction of the movable jaw, and the mechanism by which it is actuated, are somewhat different, the essential characteristics which I have described as being found in the Michigan Southern and the bayonet-machines are each one of them to be found in the Cawood machine, doing precisely the same thing in precisely the same way, and for precisely the same purpose. It has the fixed and movable jaw, with the faces or dies made to fit the object to be clamped between them, which serve as an anvil to receive or resist the blows of the hammer which is applied to such object. It encloses the object firmly, and maintains the form of that part of the object that is enclosed between them, and leaves exposed above them that part of the object upon which the smithing operations are to be performed.

698 It appears to me there can be no question that these essential characteristics which are in substance to be found in the machine set forth in the patent, and are in my judgment those properties which give it its utility, are to be found equally present and equally useful and important in each and every one of the machines that I have referred to in this comparison. In the bayonet-machine, the part which serves to resist the blow of the hammer in exhibit "C. E. M., U. S. Commissioner," is the bottom of the curved recesses in which the shank of the bayonet is held until a head has been formed upon that part of the shank which extends above the jaws. After the head is commenced to be formed and projects over the tops of the dies, then the upper surface

of the dies also acts as an anvil. At the next stage of the operation the shank of the bayonet is held in the same way as last before stated, and the top of the dies serves as the anvil, because the part or plate resting upon them is the thing or part upon which the smithing is to be done, to plate out and reduce in thickness the plate from which the socket of the bayonet is to be subsequently made. At the next stage in the manufacture of the bayonet, the dies are formed to receive the object in the condition shown in defendants' exhibit "Bayonet Socket and Mandrel," and complainant's "Iron Bayonet Machine," in which case the semicircular recess formed by the dies which embraces the shank and lower half of the socket serves as a mandrel to support the object while the weld at the upper surface is closed, and the form of the socket given to it by a die or swedge applied to the upper surface by a trip-hammer.

Thus it will be seen that in each of these cases the supporting surfaces or those surfaces which resist the blow of the hammer are
699 arranged so as best to support the object under the blow, and are to be adapted in each case to the special purpose to which they are to be applied, in the same general way and for the same reason that the form of the dies is changed to adapt them to an especial use. It is a part of the general property of adaptation which attends the use of all such machines, and which is fully recognized or implied in the Cawood patent, in adapting the Cawood machine to the varying forms of rails upon which it was intended to be used.

Q. 14. Look at model marked "X. E. A. D." and state what it represents.

A. It represents a machine which has been known in the previous trials before mentioned as the angle-iron machine, and which I have heard described by a Mr. Greenleaf in the trial at Chicago before mentioned, and stated by him to have been used at Cincinnati in the forging of iron bars or rails for making the frames of locomotive-engines.

Q. 15. Look at model marked "Y. E. A. D." and state what it represents.

A. It appears to represent a machine for mending or holding rails, the same in construction as one-half of the angle-iron machine, with the faces of the jaws formed to receive the sides of a common T-rail, instead of the plain sides which were used in the angle-iron machine, the jaws being moved and guided in the same way as in the angle-iron machine, and in the same relation to the block of iron to which the fixed jaw is attached when it serves as an anvil to resist the blows of forging.

Q. 16. Compare the parts severally, the means of combining them, and the mode of operation in the angle-iron machine with the corresponding parts, means of combining them, and the mode of operation in the Cawood machine, and then state whether the machine,
700 as described and specified in the Cawood patent, is substantially different from or substantially the same as the angle-iron machine.

A. In the angle-iron machine and in the Cawood machine is to be found, commencing at the bottom, a large mass of iron, which, by its weight and inertia, serves as an anvil, and upon this is raised a block, having its face vertically of such form as will fit the side of the bar or rail to be held next to it when the bar or rail lies across the anvil in its natural position. On the opposite side of the bar or rail is placed a movable block, the face of which is also formed to fit the opposite side of the rail. This block is properly guided to move to and from the fixed block, and is forced towards it by means of an eccentric or any suitable way which will clamp the rail or bar sufficiently firm to hold that part in shape which is between them. The part of the rail or bar which is

above the jaws is exposed so as to receive any operation of smith-work it may be desired to bestow upon it. The general arrangement of the parts of the angle-iron machine, and its construction, more nearly approach the form of the Cawood machine than do the bayonet-machines, and the identity of the two machines under comparison is most obvious, by comparing Exhibit Y with Exhibit X. A machine constructed like Exhibit Y would obviously be substantially like the Cawood machine, and it is equally certain that the only difference in the construction and operation between Exhibit Y and the one-half of the angle iron machine Exhibit X, is simply in the form of the face of the jaws. There can be, in my opinion, no doubt but that the angle-iron machine, so called, is substantially the same as the machine of Cawood in its principles of construction and in its mode of operation. I am aware that in the use of the
701 machine, as stated in evidence by Mr. Greenleaf, that the angle-iron machine was used to forge angle-iron in a way described by him from two bars welded together, and that it was the intention in the use of this machine to so hold the bars thus welded that they would be spread laterally by hammering and reduced in thickness, and leave a fillet or circle at the internal angle of the two parts; and for this purpose the height of the jaws was made such that the bar did not reach the bottom, because it was desired to leave the bar at liberty to spread or increase in width in both directions. In this case, as the spreading or plating of the bar was the object desired to be accomplished, the bar rested upon the top of the jaws when the hammer struck it, and was changed in form in that part only, while the part between the jaws was maintained in its previous form. Thus, in this case the result produced was of precisely the same character as is produced in the Cawood machine—that is, that the part of the bar whose form is to be preserved is clamped between the jaws, and that part which is to be modified in form by forging is exposed above them. If it had been desired to maintain a constant height of the bar, and operate only upon the top of it in the angle-iron machine, it would obviously have been within the ordinary adaptations of that machine or of the Cawood machine to adapt it to a specially formed bar or a specially formed rail. The similarity between the parts severally of the angle-iron machine to those corresponding parts in the Cawood machine is such that the description in the Cawood patent, which relates to the jaws and their operation, applies to the one with nearly the same accuracy as to the other. The greatest dissimilarity is in the absence of the dovetails to hold the movable block to the anvil, and the arrangement of the eccentric shaft
702 or axis vertically, instead of horizontally, and in not having the means of drawing the movable block back by means of the eccentric, as is found in the Cawood machine.

Q. 17. Compare the parts severally of the bayonet-machine, "Complainant's Iron Bayonet Machine," "Defendants' Model A 3 Bayonet Machine," and "Defendants' Exhibit C. E. M., U. S. Commissioner," the means of combining them, and the mode of operation with the corresponding parts, means of combining them, and the mode of operation of the machine described and specified in the patent of Cawood, and then state whether the two machines are substantially the same or substantially different.

A. In the bayonet-machine there is first an anvil or mass of iron beneath the machine which serves to resist the blow, and upon this is placed an upright fixed jaw or block, to which is fixed a die corresponding to one side of the object to be held in it. With this is connected a movable jaw, carrying a die corresponding to the opposite side of the

same object. The movable jaw is forced forward toward the fixed jaw by means of a roller acting as a cam upon the surface of the movable jaw which serves to compress the object placed between the jaws, if it is of the proper size to fit them, and hold it while any desired operation of smithing may be performed upon it, as I have already described. Although there is some dissimilarity in the external form of the machines, and the movable jaw vibrates toward and from the fixed jaw upon an axis instead of sliding in a plane, as in Cawood machine, I do not consider that these minor details of construction change the essential characteristics of the machine, and for this reason I do not consider that the style of construction adopted in the Michigan Southern model, before referred to, essentially changes the character of the machine
703 from that shown in the Cawood patent, as these details do not affect the mode of operation or the result produced by it. For these reasons I regard the two machines as substantially the same in every essential particular.

Q. 18. Compare the parts severally, the combination of parts, and the mode of operation of the Church machine for holding bars, represented by the model marked "Defendants' Exhibit Church Machine No. 1," with the corresponding parts, combination of parts, and mode of operation of the machine described in the Cawood patent, and then state whether the two machines are substantially the same or substantially different.

A. In comparing the Church machines with the Cawood machine, it is to be remembered that the scope of the Church machine was very much wider than that contemplated by the Cawood machine, as described in the patent, and the Church machine was designed to accomplish those operations by mechanism, which in the Cawood machine are designed to be performed by the hand of the operator. And while the Church machine embraces, in my opinion, substantially the combination of parts which is found in the Cawood machine, operating as a combination in precisely the same way, and producing precisely the same result, there are other parts of the mechanism for applying the power of steam to the machine, and for applying shaping dies, to which there is nothing to correspond in the Cawood patent. In this comparison I also think it should be borne in mind that the function of the essential combination in Cawood's machine is to hold a rail and keep it in shape by means of suitable dies fitting the same, and leaving a portion of the thing thus held exposed so as to be operated upon in that part by some other agency. In this view, comparing defendants' model "Church
704 Machine No. 1," we find a fixed die resting upon and connected with a bed beneath it, upon which the rail is laid in its natural position, and to one side of which the die or press-block is adapted, and sliding upon this bed is a movable die or block of a proper configuration to fit the oposite side of the rail. The movable block is forced towards the fixed blocks by toggle-joints, which efficiently press the rail laterally between the two blocks and hold it firmly in shape while the part of the rail exposed above and between the two blocks may be acted upon while thus firmly held and forged into the shape desired by a die or swedge. The fact that this machine, as described in the patent, was designed for straightening rails does not change the essential characteristics of the combination or of the operation that is performed by it. The essential characteristic of the result produced by this combination is, first, that it holds the thing firm and rigid with sufficient force to resist any operation that may be bestowed upon it while thus held, and, second, to keep the thing thus held in shape under any required

operation, by having the form of the dies fit the form of the object thus held. This is all that these two dies do, whether in straightening a rail or mending it, and it is utterly immaterial to the operation of this combination what is the character of the subsequent operation, so long as it usefully employs this operation of holding the rail, as I have stated it. In the Cawood machine, if a rail were placed in it and clamped, the machine has done its appropriate work, whether a piece of iron be welded upon the rail or not, its function ends with holding and supporting the rail under the conditions that I have mentioned. And in judging of this combination as it is found in the several machines under examination, I think we should separate the thing done or the result of the combination from the other operations on the iron thus held

705 with which the combination has immediately nothing to do. From this point of view we see the Church has all the appliances for holding the iron under the conditions before named and for producing the same result. I would also add, in this connection, that the property of adapting the dies to the special work to be done is exemplified in the Church patent by the great variety of forms of dies which he proposed to use in his machine, and the varieties of form and dimensions in which he proposed to construct his machine, to adapt it to the several purposes mentioned. In the patent there are shown eight different forms of dies, which he proposed to use for different purposes, and three different forms at least in which he proposed to construct his machine, retaining at the same time the same mode of operation. These forms of dies I consider to be precisely analogous to the change in the forms of the dies or blocks contemplated by Cawood to adapt his machine to the various forms of rails. For these reasons I am clearly of the opinion that the Cawood machine is found substantially in the machine of Church, and that if the Cawood was the earlier machine of the two, the use of the fixed and movable lateral dies in Church's machine would unquestionably be an infringement of Cawood's patent.

Q. 19. What has the Church machine marked "Defendants' Exhibit Church Machine No. 1 A" and "No. 2 A," to do with the holding machine marked "Defendants' Exhibit Church Machine No. 1 and 2," if anything, more than the sledge-hammers have to do with the Cawood machine?

A. They have nothing whatever to do with it. They are in each case an agency which comes into operation or not at the will of the operator after the operation of clamping the enclosed object has taken place.

706 Q. 20. Do you find any description in the Cawood patent of the use of the metal below the opening of the jaws to support the rail against the blows of the hammer?

A. I do not, except inferentially, as the metal at that place is a part of the block which is called the anvil or swedge-block, which, as a whole, resists the blow of the hammer. I do not find that any special office for that part of the swedge-block is described anywhere in the patent.

Q. 21. Do you find anything in the patent indicating that Cawood had any intention of so using the metal which is below the opening of the jaws, or that he had any idea of limiting his patent to such use of that metal?

A. I do not.

Q. 22. What kinds of movable press-blocks do you understand to be included within the description of the Cawood patent?

A. Such blocks as would fit the side of the rail next to them, and

could be pressed up and held against the opposite fixed block, and leaving that part of the bar thus held exposed which was to be operated upon in smithing it. I think that he intended to include all forms of bars or rails which needed to be treated in this manner—that is, the holding them in position and in form, while the smithing operation was performed upon the exposed surface, not enclosed between the jaws.

Q. 23. What kind of fixed press-blocks do you understand to be included within the description of the Cawood patent?

A. Blocks having the same characteristics as the movable blocks, as I have just stated them, excepting that it is fixed upon the anvil instead of movable.

707 Q. 24. In what manner and by what means may the two clamping jaws be combined and operated within the description of the Cawood patent?

A. I think that any means which will guide them accurately to the opposite sides of the bar to be clamped, which may be operated readily, and will hold the movable block firmly against the bar and the opposite block, and shall also have sufficient inertia either in themselves or in the mass upon which they rest, as to be able to act as an anvil to resist the blows of a hammer.

Q. 25. State what function is by the description of the Cawood patent ascribed to the metal immediately below the opening between the jaws?

A. I do not recollect that there is any particular function ascribed to that part.

Q. 26. What can you say respecting the specification of Cawood furnishing any known limitation to the shape of the face of the clamping jaws?

A. I do not think it furnishes any limitation, but is, to my mind, apparently intended to be applied to all shapes to which it might be found expedient to adapt the machine.

Q. 27. Give us some idea of how many forms of railroad-bars you have known of, and what are the forms of some of them?

A. I have no idea how many different kinds of rails that I have seen, but there are a great many, and I have also seen a great many forms of cross-sections of rails in books that I never saw in practice; also a great many different shapes of rails having the same name, as, for instance, what is known as the common T or H rail is made with a great variety of sizes and a great variety of different shapes, within the same general dimensions, having different cross-sections. Then the T-

708 rails, having the ordinary formed head, with parallel sides below it, in several varieties, one of these being the fish-belly rail, so called, the lower edge of which lengthwise was undulating, giving alternately greater and less depth at the widest and narrowest parts; then the U-rail, so called, the strap rail or plate being a bar or quadrilateral section, with one corner rounded; then double-headed rails, or rails which may be used either edge up; then a great variety of rails of other forms, in cross-section, which I cannot now pretend to recall, but which may be found in books relating to railroad matters in great variety.

Q. 28. Is the bayonet, "H. B. R., No. 53," which accompanies the complainant's iron bayonet-machine a perfect bayonet for that machine?

A. It does not appear to me to be a perfect bayonet in the first place, and in the next place does not appear to be of proper size to fit the dies in that machine, and was evidently made in a machine of another size, somewhat smaller.

Q. 29. Examine defendants' exhibit "Bayonet Socket and Mandrel, J. G., jr.," and say whether it is capable of being welded in that machine, "Complainant's Iron Bayonet Machine."

A. It is; it is adapted to the sizes of the dies in the iron machine, so as to do the work properly, I should think.

Witness is tendered for cross-examination.

Complainant asks for an adjournment of the cross-examination, on the ground of the absence of his counsel at Windsor, on account of the illness of his mother, which was known to both parties on Saturday last, as stated by complainant, and further says that he would not
709 have agreed to proceed with the examination of the witness today had he not assumed that such adjournment for cross-examination would have been allowed.

Counsel for defendant, being assured by Mr. Turrill that it is the intention to cross-examine Mr. Hibbard, consents to the adjournment.

Cross-examination adjourned to October 19, 1869, at 12 m.

JOSEPH GUTMAN, JR.,
Examiner, &c.

OCTOBER 19, 1869.

Present: Complainant, and George Gilford, esq., in behalf of defendants.

WM. C. HIBBARD, being cross-examined by complainant, deposes as follows:

X. 30. Does the Church patent describe or suggest that the machine for straightening rails shown at Figs. 12 and 13 of the drawings is to be divided into parts, as represented by defendants' models, "Exhibit Church Machine No. 1," and "Exhibit Church Ma' No. 1 A?" If it does, quote the language describing or suggesting the division.

A. It does not.

X. 31. Does the Church patent describe or suggest that the machine for making hollow rails, shown at Figs. 31 to 35, inclusive, is to be divi-
ded into parts as represented by models, "Defendants' Exhibit
710 Church Machine No. 2," and "Defendants' Exhibit Church Ma-No. 2 A?" If it does, quote the language describing or suggesting such division.

A. It does not.

X. 32. What would be the cost of building a machine, as described in the Church patent, for making a railroad-rail of the ordinary length of from 18 to 28 feet?

A. I could not tell even approximately, but probably several thousand dollars.

X. 33. Didn't you state at the trial at Chicago, in the fall of 1867, that it would cost $10,000 or more to construct such a machine?

A. I have no recollection of stating anything about it.

X. 34. Didn't you state at the trial at Detroit, in the summer of 1865, that it would cost $10,000 or more to construct such a machine?

A. I have some faint recollection of being cross-examined as to the probable cost of a Church machine, but have no recollection whatever of what amount I mentioned, if any were mentioned. I do not now remember the details of the examination in this respect at all.

X. 35. Did you not make the following answer to the following question, put to you at the trial of the case of S. H. Turrill and others against the Michigan Southern and Northern Indiana Railroad in the summer of 1865, at which time you were present, viz: "Question. Can

you tell us what it would cost to make a machine like the Church machine, as represented by the model of the length of the 21-foot
711 rail, and constructed with requisite strength to do the work of welding?"

"Answer. I cannot; I should think that at present it would cost about $10,000."

A. It is quite possible that I so answered to such a question, although I have no recollection now as to what I then stated, except in a very general way.

WM. C. HIBBARD.

Subscribed and sworn to before me this 19th day of October, 1869.

JOSEPH GUTMAN, JR.,
Examiner, &c.

Cross-examination of the witness Henry B. Renwick waived by the complainant.

JOSEPH GUTMAN, JR.,
Examiner, &c.

713, 714 United States circuit court, northern district of Illinois.

SAMUEL H. TURRILL
v.
ILLINOIS CENTRAL RAILROAD COMPANY and John M. Douglas. } In chancery.

SAME
v.
CHICAGO, BURLINGTON AND QUINCY Railroad Company and Amos T. Hall. } In chancery.

SAME
v.
MICHIGAN SOUTHERN AND NORTHERN Indiana Railroad Company and E. B. Phillips. } In chancery.

SAME
v.
CHICAGO AND ALTON RAILROAD Company and T. B. Blackstone. } In chancery.

SAME
v.
PITTSBURGH, FORT WAYNE AND Chicago Railroad Company, etc. } In chancery.

715 *Testimony.*

Depositions of witnesses on the part of the defendants taken before P. A. Hoyne, United States commissioner, at Chicago, December 21, 1869, and January 12, 1870; also depositions taken at Cleveland, Ohio, January 6, 7, and 8, 1870.

S. M. Whipple for defendants; complainant in person.

SHAW STEWART.

Direct examination:

Int. 1. What is your name, age, residence, and occupation, and how long have you been so employed, and for whom?

Ans. My name is Shaw Stewart. My age is 38 years; residence, 1400 State street, Chicago, Illinois. I am a blacksmith. I have been so employed for twenty-three years. I served my time in Ayrshire, Scotland. I worked one year in New Haven, Connecticut, for the New York and New Haven Railroad; the balance of the time—seventeen years—for the Illinois Central Railroad. For the last seven years I have been foreman of the blacksmith-shop at Chicago.

Int. 2. Does welding railroad-rails or repairing the same come under your supervision? If yea, for how long have you had charge of that particular department?

Ans. It does. I have had charge of that department for about seven years.

716 Int. 3. Have you at any time received an order to plane out the rail-seat of a rail-block used by your company for repairing rails? If so, when? and state all the circumstances connected with the fulfillment of the orders.

Ans. I did receive such an order in the summer of 1867. I got orders to take out $\frac{3}{8}$ of an inch. In giving my order there was a mistake made; instead of $\frac{3}{8}$, the man, the planer, understood $1\frac{3}{8}$ inches. I came along and stopped him, and made a key to fill up the vacancy.

Int. 4. You say "vacancy." Do you mean that the key filled up the entire vacancy planed out, or only so much of the vacancy as the workman transcended the order?

Ans. I mean just as much as he transcended the order.

Int. 5. What was the whole amount that he planed out?

Ans. Seven-eighths of an inch.

Int. 6. Then what was the thickness of the key that you put in the vacancy?

Ans. Five-eighths of an inch.

Int. 7. Look at model marked "Illinois Central Block," and state whether it correctly represents the block used by your company in repairing rails, and whether it represents the block as planed out with the key in the same, and whether there was a clearance underneath the bottom of the rail as represented in the model when the rail is clamped in the jaws?

Ans. It does. It does represent the block as planed out with the key in. There was——

Int. 8. How much clearance?

Ans. One-quarter of an inch.

Int. 9. Did you put a man to work on this block so planed out and with a key in the same? If yea, what was the result of such operation?

Ans. I did. I found it would work just as well as it did before.

717 Int. 10. Have you since that time removed the key from the block; and does such key, marked "Illinois Central Key," attached to the model, correctly represent the key so removed and the cavity underneath the rail as seen in the model; and, if yea, have you continued the use of the block so altered? If yea, with what success?

Ans. It does correctly represent the key and the cavity underneath. We have continued the use of the block so altered, and we do not know any difference.

Int. 11. What kind of work have you been doing without said support to the bottom of the rail for the past two or more years?

Ans. Making frogs.

Int. 12. Look at model marked "Bayonet Vise," and state what it represents.

A. It represents a tool we have up in the shop we call the bayonet-machine. We repair rails and make frogs in the machine.

(Counsel for the plaintiff objects to the counsel for the defense prompting the witness after the interrogatory has been put to him by the commissioner, the witness understanding the same.)

Int. 13. Where was a machine represented by the model constructed and put in operation, and how long has it been in use for repairing rails and making frogs?

A. It was constructed in the year 1867, and has been used ever since for making frogs and mending rails.

Int. 14. How much clearance is there between the rail-seat and the bottom of the rail?

A. About 5-16 of an inch.

Int. 15. And has such been the case since the summer of 1867 up to the present time?

A. It has.

Int. 16. Look at the model, and state whether the space is correctly represented when the rail is clamped in the jaws.

A. It is.

718 Int. 17. Was a machine constructed in accordance with the model, the same that you are now using, brought into court on the trial of S. H. Turrill v. The Illinois Central Railroad in October, 1867, and did you then and there testify as to its use for a time prior to the trial?

A. There was such a machine made and brought into court, the same that we are using; we had used it then about six weeks. I did testify as to its use.

Int. 18. What can you say in relation to the preservation of the neck of the rail and the holes in the neck while in the jaws for repairs?

A. It protects the neck and saves the holes from closing together, thereby enabling the fish-plates to be put on again without any trouble.

Int. 19. Can you say the same of a machine or block that fits the rail on the bottom and sides when cold?

A. No; the holes have to be mandrilled—the holes—in a great many instances; and also to fuller or cut the top or neck of rail to allow the fish-plates to go in place.

Int. 20. Why do you have to do this?

A. The rail being hot and hammered down shortens the neck of the rail, so that the fish-plates will not go back in place without being fullered up or cut with chisels.

Int. 21. Why will it hammer down? Please explain all about it.

A. The rail being hot expands, and hammering it down on to the jaws causes it to be the shrinkage lower.

Int. 22. Do you speak of a rail which has a support under the bottom, or one that has no support?

A. The rail with a support under the bottom.

Int. 23. Then it is this bottom support, is it, that causes the neck to upset and the holes to close, or is it from some other cause?

A. From no other cause, as far as I can see, than the resting of the support on the bottom of the rail.

719 Int. 24. Has there been constructed at your shop a machine for repairing rails called the angle-iron machine; if so, when?

A. There was, in the year 1867.

Int. 25. Was such a machine introduced in court at the trial of the cause before alluded to?

A. There was.

Int. 26. Did the rail rest upon the seat of the anvil in the angle-iron machine, so produced in court?

A. No.

Int. 27. What was the space or clearance between the bottom of the rail and the anvil underneath?

A. Five-eighths of an inch.

Int. 28. Do you know this from actual measurement?

A. I do.

Int. 29. Was such machine used for repairing rails? If so, with what success?

A. It was; we could not do so much work as we could with the other machine by one-quarter. I mean the Illinois Central machine and the bayonet-vise.

Int. 30. Why could you not do so much by a quarter?

A. We had to put the rail in endwise into the jaws, instead of dropping down the rail into the jaws, and it took longer time, thereby losing part of our heat.

(Plaintiff objects to the counsel for the defense prompting the witness in his answer by using the words to witness, "dropping down the rail into the jaws.")

Int. 31. Was or not the quality of the work as good, though not as much, as that done in the Illinois Central block or on the bayonet-vise?

A. I did not know any difference in the quality of the work.

720 Int. 32. Can a smith and two helpers do as much work in a day of ten hours in the Illinois block or bayonet-vise, with no support to the bottom of the rail, compared with the same blocks which do give such support?

A. They can do just as much without the support as with it.

Int. 33. In cutting off rails where no patching is required, what is the method of doing such work at your shop?

A. We always cut them off on a plain anvil face.

Int. 34. Do you or not use the jaws sometimes for the purpose of cutting them off? If not, why not?

A. I have never done it and never saw it done, because I do not see any benefit to be derived from it.

Int. 35. Is it your opinion that the jaws are not necessary to cutting off rails?

A. It is my opinion that they are not required to put the rail in the jaws to cut it off.

(The complainant objects to each and every one of the foregoing interrogatories, and to the several answers thereto, in regard to the use, or opinion in the use, of the machine with the bottom out, as incompetent and irrelevant to any matters at issue in each of the foregoing cases.)

Cross-examination:

X Int. 1. Under whose supervision and by whom are the machines used in repairing rails for the Illinois Central Railroad Company made and constructed?

A. I suppose Charles F. Scoville, at the car-works.

X Int. 2. How many machines have the Illinois Central Road had in use at one time on the road, and how many have they now in use?

A. I do not know how many they have had or now have.

X Int. 3. About how many have you made or had made for that company?

A. I never made any.

721 X Int. 4. Have you ever seen any in use, other than your shop, on the line of the Illinois Central Railroad?

A. I have, at Champaign. I have never been in any other shop. I saw them at Champaign about twenty months since.

X Int. 5. How many machines did you see there, and who was working them?

A. I saw two, and I believe there was one or two more there; I did not see any of them at work.

X Int. 6. Had the bottom been taken out of them at Champaign, as shown by the model marked "Illinois Central Block?"

A. I could not say; I did not pay any particular attention to them; I did not look.

X Int. 7. How long has any machine like model marked "Illinois Central Block," and how many, been in use at the shops of the Illinois Central in Chicago?

A. About two years and five months; only one.

X Int. 8. Have they or not had any machines at the shops of the Illinois Central Railroad at Chicago for repairing rails and making frogs for only two years and five months?

A. They have had them for fourteen years.

X Int. 9. How did the machines differ from the machines referred to, which you say you have used two years and five months?

A. The difference is that the bottom is planed out from the bottom of the block.

X Int. 10. How many machines have been in use besides the one with the bottom planed out at said shops for the past fourteen years?

A. Sometimes two and sometimes three.

X Int. 11. Have they been generally steadily employed?

A. At intervals they have all been steadily employed; for several years we only used one at the said shops.

X Int. 12. What was that used for, and by whom?

722 A. It was used for making frogs and mending rails by Cornelius Tuhoy and others; he is the first I remember of using it for mending rails; this was, I should think, about eleven years ago.

X Int. 13. How many machines have you in use and out of use in the said shops at the present time for mending rails and making frogs?

A. Three in use and two out of use.

X Int. 14. Who did you first get your orders from to take the bottoms out of said machines, and who brought you said order?

A. Mr. Hays, the superintendent of machinery of the Illinois Central Railroad.

X Int. 15. Did he state to you anything why he wanted the bottom taken out?

A. He did; he said he was requested to have it taken out and try it, and report to him how it worked.

X Int. 16. Has the machine, like model Illinois Central Block, been in constant use for the past two years and five months since the bottom was planed out?

A. No.

X Int. 17. In which shop is it used?

A. In the rail-shop.

X Int. 18. Is the bottom taken out so that no portion or part of the flange rests on the bottom or anvil?

A. It is as per model.

X Int. 19. Is not the bottom of the machine taken out so that when the rail is placed in the machine the outer edges of the flange rests upon the anvil as it was before any part of it was taken out?

A. The edges may touch the casting, but the bottom is perfectly clear.

X Int. 20. Are you positive as to that, or is there more than one machine in the shops like the model which has the bottom cut out?

723 A. I am positive there is only one machine cut out.

X Int. 21. In referring to the model marked "Bayonet Vise," why do you call it bayonet-machine?

A. For the reason that they had a similar machine for making bayonets at the armory in Massachusetts, I believe.

X Int. 22. Did you ever see any machine for making bayonets?

A. I never did.

X Int. 23. If any person had shown you the model, as constructed, and you had never heard any name given for it, what would you have called it from its construction?

A. A T-rail machine.

X Int. 24. Did not the machine which you say was in court have two sets of jaws, one set being a little higher than the other at the time it was produced in court in October, 1867? If so, what was the difference in the height of those jaws?

A. There was two sets of jaws, I believe; I never measured them; half an inch.

X Int. 25. What was the height of the jaws, and for what pattern of rails were they adapted to fit while being repaired?

A. I do not know the height; they were made for 3½ inches and 4 inches high.

X Int. 26. What kind of rail did or do you repair in that machine, the fish-joint or the old T-rail?

A. Principally the fish-plate pattern; we repair very few of the 3½ pattern or old T-rail on our division.

X Int. 27. What is the height of the fish-joint rail in your division?

A. Four inches.

X Int. 28. Was not the two sets of jaws that were with that machine when produced in court made to fit the fish-joint rail?

A. I cannot swear.

724 X Int. 29. Do you use two sets of jaws in this machine or only one?

A. Two.

X Int. 30. You speak of an angle-iron machine being constructed for repairing rails in your shop. Why do you call it an angle-iron machine? Do you make angle-iron on it or in it?

A. Before the period of rolling angle-iron, you could not purchase such a piece as you would want; we had to clamp and bend iron, making it right angles, which gave it the name of angle-iron machine.

X Int. 31. Did you ever see an angle-iron machine for making angle-iron?

A. No, sir.

X Int. 32. Then why do you call this an angle-iron machine?

A. An old gentleman from Cincinnati told me so. He said he had used it.

X Int. 33. Did he tell you that he had used that exact machine as

you had constructed it, or did he tell you that he had used a machine for making angle-iron?

A. He did not; there might have been a vast difference in the two machines, but still the same principle.

X Int. 34. Did he tell you about this before you had had this machine constructed, or at the time he was here as a witness at the trial in October, 1867?

A. At the time he was here at the trial in 1867.

X Int. 35. Who ordered that machine to be made, and who constructed it?

A. I do not know who ordered it to be made; it was constructed at the car-works of the Illinois Central Railroad.

X Int. 36. Was there not an iron roll for the flange of the rail to rest on when in the machine?

A. I believe not.

725 X Int. 37. Was there not an iron roll placed at one end of the jaws?

A. There was.

X Int. 38. How much did you see that machine in use personally, and how much has it been in use since it was constructed?

A. I did not see it in use but a very short time; as to how long we have used it altogether, I could not say.

X Int. 39. Has it been in use any since the trial in October, 1867, for the purpose of repairing rails?

A. No.

X Int. 40. Do you know where it is at the present time?

A. It was in the shop last night.

X Int. 41. When did you take out this key, as you call it, out of the machine like model marked "Illinois Central Block;" and by whose orders, and who delivered you the order?

A. About six weeks ago; I think Mr. Whipple; Mr. Whipple himself gave me the order.

X Int. 42. What Mr. Whipple do you mean; the one that is present taking this testimony?

A. Yes, sir.

X Int. 43. What reason did he or any one else give you for having the key taken out?

A. For some objections, I understand, on account of the rail resting on the key, but which did not; but he wished me to have it taken out.

X Int. 44. Is that all the reasons as stated to you by any one?

A. Yes, sir.

X Int. 45. How much have you seen the machine used since the key was removed from it?

A. It is impossible for me to give you a direct answer; but as near as I can judge, altogether about two days.

726 X Int. 46. Are you employed in the same shop where the machine is used?

A. I am.

X Int. 47. In what capacity?

A. As foreman.

X Int. 48. Is the machine used in the rail and frogs-hop or in the machine-shop?

A. In the rail and frog shop.

X Int. 49. Are you employed in the machine-shop any; if yea, how much?

A. No; only in the blacksmith-shop.

X Int. 50. How far is it from the blacksmith-shop to the shop where they repair frogs and rails; and in which shop are you principally employed?

A. About fifty yards, more or less; and most all of my time is in the blacksmith-shop, although I have charge of both shops.

X Int. 51. How often are your services called into the frog and rail shops ordinarily?

A. About four times a day; sometimes twenty times.

X Int. 52. How many machines has the Illinois Central Company got in use, constructed like model called "Bayonet Machine?"

A. Only one to my knowledge.

X Int. 53. What kind of rails is in use on this division of the road; and how long have they been in use; and is there different kinds in use at the present time in the fourth division, and what part of the road does the fourth division cover?

A. Two kinds; three and a half and four inches, principally four inches; three and a half have been in use ever since any rail were laid about eighteen years since; about four years ago they commenced laying down the four-inch rail. The fourth division covers from Chicago to Kankakee.

727 X Int. 54. When you speak of the three-and-a-half-inch rail, do you mean the old-fashioned T-rail; and when you speak of the four-inch rail, do you mean the fish-joint rail?

A. I do.

X Int. 55. How much of the track of the fourth division is laid with the old-fashioned T-rail for the past two or three years and at the present time?

A. I could not answer the question.

X Int. 56. Is there any of the track of the fourth division of the old-fashioned T-rail at the present time?

A. There is.

X Int. 57. How much of the time has the machine like model "Illinois Central Block" been in use; and when, since the trial of S. H. Turrill et al. v. The Illinois Central Railroad Company, in October, 1867?

A. It has been in use for the last fifteen months; about three months in the old blacksmith-shop and nearly one year in the rail-shop.

X Int. 58. What special work was done on it; was it making frogs or repairing rails?

A. Exclusively for making frogs.

X Int. 59. What special work has been done on the machine like model marked "Bayonet Vise?"

A. Repairing rail and making frogs.

X Int. 60. Which set of jaws have been used in the machine, the three-and-a-half-inch or the four-inch?

A. Both.

X Int. 61. Which has been used the most, and how much has the four-inch jaws been used in the machine since 1867?

A. Four-inch has been used the most, nearly two-thirds of the time.

X Int. 62. What kind of frogs do you manufacture, and how are they made?

A. Wrought-iron T-rail frogs; laid with steel on point and side rails by cutting a piece out of the rail and laying steel in to make it up to its original height.

728 X Int. 63. About what is the cost to the Illinois Central Railroad Company to make these frogs, in material and labor?

A. Seventy-five dollars for each.

X Int. 64. What part of the work for making the frogs is the machine used for?

A. We use it when we lay on the steel.

X Int. 65. How much steel do you ordinarily lay on a frog as it is constructed, in feet and inches?

A. Thirteen feet, more or less.

X Int. 66. About how much longer will a frog last in the road where it has been laid with steel than a wrought-iron frog?

A. I should say twice as long.

X Int. 67. Will it not last more than twice as long?

A. In some cases it will.

X Int. 68. What kind of a business could you make it in putting steel on the rail for frogs without the use of the jaws to hold and support the rails while you are putting the steel on; would it be a profitable business for the company?

A. I have laid steel on without jaws nearly as quick as with them, but not so good a job. I should not think it would be profitable for the company.

X Int. 69. Could the men that you employ to make frogs put the steel on without the aid of the machine, and make a frog that would be serviceable to the company?

A. I don't know. I never tried them without it.

X Int. 70. How many frogs did you ever lay the steel on without the aid of the jaws?

A. From fifteen to twenty-five.

X Int. 71. How came you to do this without the aid of the machine?

A. There was no machine used in the shops at the time.

X Int. 72. Is the Illinois Central Railroad Company making frogs at the car-works? If yea, how many machines do they use; and are they making them for other parties besides themselves?

729 A. They have made three; they have not used any machine, not being required, they being made of steel rail; these were for Crerar, Adams & Co.; these were made last year; at the present time they are not making any that I know of.

X Int. 73. Do you keep an account of the number of rails patched, and the inches put on them, and of the frogs made; if yea, to whom do you return the account and how often?

A. We do keep such an account; we return such account to the head clerk, W. Horton, and William Keith, the storekeeper; we make this return monthly.

X Int. 74. How much could you use at one fire per day in patching rails; and the number of men employed at such fire, and the wages of the same per day; and the kind of fire used, blast or bellows?

A. About three hundred pounds; three men at each fire; one blacksmith and two helpers; blacksmith we pay $2.80 and the two helpers $1.95 each; we use a long, slotted trier iron, open fire and blast.

X Int. 75. What do you pay other blacksmiths in the blacksmith-shop per day?

A. Three dollars and seventy-five cents, $3.70, $3.40, $3.25, $2.75, $2.50, and $2 25.

X Int. 76. Is the wages in the last answer all for blacksmiths that are foremen of their fires in the blacksmith-shop, or is some of it for the helpers that are at work in the blacksmith-shop?

A. Exclusively for foremen of the fires.

X Int. 77. How long a patch on a rail in feet and inches have you put on in one welding heat?

A. From twelve to fourteen inches; I have heard of more being done, but never saw it.

X Int. 78. What is a fair average day's work in feet or inches in patching rails as it has been done in your shop?

A. When we get good rails, 235 inches.

730 X Int. 79. What width and thickness of iron do you use in patching rails?

A. Two and a quarter inches by three-eighths of an inch, and the same width by half an inch and sometimes five-eighths of an inch.

X Int. 80. What is the cost of this iron used in patching?

A. I believe at the present time it is four cents per pound.

X Int. 81. After a rail has been properly patched, is the part patched more or less serviceable, or will it wear longer than other portions of the rail which has not been patched?

A. It will wear just as long, and in a great many instances longer.

X Int. 82. What part of an inch in height will a rail expand when heated to a welding heat?

A. One-eighth of an inch to the foot.

X Int. 83. How do you know that?

A. By the expansion and contraction of work that I have worked on. I suppose a rail made of iron will expand the same as a bar of iron.

X Int. 84. How much, then, would be the expansion in height of a three-and-a-half-inch rail and a four-inch rail?

A. One thirty-second for a three-and-a-half-inch rail; trifle more for four-inch rail.

X Int. 85. If a machine is adapted to mend the four-inch fish-joint rail, the rail resting on the anvil, the jaws covering up and fitting under the crown and up to the center of it when cold, what is going to be the difference in the height of that rail, after it is repaired in the said machine, compared to the cold rail, for which the machine is adapted, as above stated?

A. Just as much as contraction and expansion consist of.

X Int. 86. Would there be any difficulty in getting the fish-plates to fit the rails if on a special pattern, and repaired in the same machines adapted to it, as stated in the last question?

731 A. It always has with us; a great many complaints have been made by the foremen that they could not get the fish-plates in; that will depend altogether on the width of the fish-plates.

X Int. 87. Are you repairing at the present time any rails to be laid in the main track of the Illinois Central Railroad; if so, what quantity?

A. We are; about fifty rails a month.

X Int. 88. How is the Illinois Central Railroad Company repairing their rails on the line of their road, and how long have they been so repairing them, and by what machine or process, and at what places?

A. At Weldon we use the old process, using the bayonet-vise. At Centralia, I believe, they roll them, heating them in furnaces; also at Amboy, only I never saw them.

X Int. 89. Have you ever seen the machine used in rolling the patch on, or a drawing of the same?

A. No.

(Signed) SHAW STEWART.

MICHAEL LAWLER.

Direct examination:

Int. 1. What is your name, age, residence, and occupation; and how long have you been so employed, and for whom?

A. My name is Michael Lawler; my age is about thirty-six years. I reside in the city of Chicago, county of Cook and State of Illinois. I am a blacksmith. I have worked at it for about seven years. I worked for the past six years and six months for the Illinois Central Railroad Company, at the welding-shop in Chicago, under Mr. Shaw Stewart, the foreman, who has just testified.

Int. 2. What kind of work have you done in that time?

A. Pretty much making frogs, with the exception of about two weeks.

732 Int. 3. Have you used any kind of a machine for holding the rail while preparing it to make frogs; if yea, what kind of a machine?

A. I have; the Illinois Central machine—like the model before me.

Int. 4. When you first made frogs in this machine, did the rail rest on the anvil, as seen in the model Illinois Central rail, when the jaw was thrown back and the lever forward, lying across both jaws?

A. It did.

Int. 5. Was the machine thereafter so altered as to remove the bottom of the rail from the anvil, as seen in the model, as the jaws are closed upon the rail?

A. It has in the machine I now use.

Int. 6. Did you use said machine for a time with a key under the rail, like model marked "Illinois Central Key;" if so, how long?

A. We used it pretty near a year.

Int. 7. When the key was in, how much space was there between the bottom of the rail when clamped in the jaws and the top of the key?

A. From a quarter to three-eighths of an inch.

Int. 8. What difference, if any, did you discover in pressing the neck of the rail when the bottom rested on the rail-seat and when it did not so rest, as you say, within one-quarter to three-eighths of an inch?

A. I do not know that there was any.

Int. 9. Has the key marked "Illinois Central Key" been removed from the rail-seat; if so, when, and has such removal been any detriment to the practical working of the machine?

A. It has been so removed; about six weeks ago. It has been no detriment that I know of.

Int. 10. Have you done, and do you do, as much work per day in the machine that gives no support to the bottom of the rail as you did in the old machine that did give such support?

733 A. I do. I average about the same.

Int. 11. In your judgment, as a practical worker in iron, is it necessary or even desirable to leave the bottom of the rail supported in patching it or steeling it, for frogs, provided the rail is supported under the head, as in the jaws of a vise?

A. Not that I know of.

Int. 12. That is, you have not discovered any necessity for such bottom support. Is that not your conclusion, after having worked the block with and without such support?

A. I do not know that there can be any difference. I cannot discern any.

Int. 13. When the rail is in the jaws, what do you first do in preparing it for the steel that is to be welded on the top of the rail?

A. We cut a piece out of the top of the rail, or we cut a channel on top of the rail about four feet long.

Int. 14. Then what do you do?

A. We prepare it for the steel. Then I weld the steel into the chan-

nel while the rail is in the jaws. When I have the frog steeled, I take it out and cut it off on the anvil to the shape I want it.

Int. 15. Do you use the same tools in steeling rails that you do patching rails?

A. I do, with the exception of a top swedge I do not use in this.

Int. 16. Do you use the same sledges, and do you apply them in the same way, in steeling rails that you do in patching them?

A. I do not patch any rails.

Int. 17. Were you to patch rails, would you use the same hammers as in steeling frogs?

A. On the welding-heat I would use sledge hammers to patch rails; on the welding-heat, steeling frogs, I would use small hammers.

734 Int. 18. After the key marked "Illinois Central Key" was removed from the machine used for steeling frogs, how much vacant place is there underneath the bottom of the rail?

A. I should say about seven-eighths of an inch.

Int. 19. How is the neck of the rail affected by welding on the steel on the top of the rail since the bottom support has been entirely removed?

A. Not any that I know of.

(The complainant objects to each and every of the foregoing interrogatories, and to the several answers thereto, in regard to the use, or the opinion in the use, of the machine with the bottom out, as incompetent and irrelevant to any matter in issue in each of the foregoing cases.)

Cross-examination:

X Int. 1. Did you ever learn the blacksmith trade?

A. No, sir.

X Int. 2. How much had you worked at it before you went to work for the Illinois Central Railway Company; and did you commence to work on frogs when you first went there?

A. Some six or seven months. I did commence so; the first job I went to work on was steeling rails.

X Int. 3. Could you have put the steel on the rail for frogs properly if you had had no machine to support the rails while doing it?

A. I could put the steel on, but not so good or so fast.

X Int. 4. What kind of rails do you use for making frogs?

A. T-rails.

X Int. 5. Do you make any frogs out of the fish-joint rail?

A. I made some two or three since I went there.

X Int. 6. Could you have made them and welded the steel on without the jaws to support it?

A. I don't know as I could; I never tried it.

X Int. 7. How wide is the key that has been taken out of the bottom of that machine; and why was it so taken out?

735 A. Two and one-half inches, as near as I can come to it; I do not know why it was taken out.

X Int. 8. How wide is the flange of a rail that you use in making frogs?

A. Four inches.

X Int. 9. Did you ever steel frogs in what is known by mechanics as a vise?

A. No.

X Int. 10. When did you first commence using the block before the key was taken out of it?

A. Somewhere about a year ago.

X Int. 11. About how heavy is the lever and ball that keeps the movable jaw up to the stationary jaw?

A. I could not say; it may be about one hundred pounds.

X Int. 12. Is the lever that is used in the machine at the present time the same one that was used in before the bottom was taken out?

A. It is.

X Int. 13. What countryman are you, and where were you born?

A. I am an Irishman. I was born in Ireland.

(Signed) MICHAEL LAWLER.

JAMES RYAN.

Int. 1. What is your name, age, residence, and occupation; and how long have you been so employed, and for whom?

A. My name is James Ryan; my age, 39 years. I reside in Chicago. I am hired by the Illinois Central Railroad Company for the purpose of working on rails, and repairing them, and making frogs. I have worked for them about nine years, and still at work for them.

736 Int. 2. During that nine years, what machine, if any, have you used for repairing rails and steeling rails for frogs?

A. I have used the Illinois Central block and the bayonet machine, like the models now before me.

Int. 3. How long have you used the bayonet-vise?

A. About two years and six months.

Int. 4. How long had you used the said bayonet-vise at the time of the trial of S. H. Turrill v. The Illinois Central Railroad?

A. I cannot tell exactly how long; I think about four or five months.

Int. 5. Was the machine with which you worked brought into court?

A. Yes; it was.

Int. 6. Did you testify at the trial at the time as to the working of the machine or vise?

A. Yes, sir.

Int. 7. What alteration, if any, has there been made in the Illinois Central block compared with what it was when you used to work on it?

A. When I first worked on it the rail rested on the bottom when the jaws were closed, and by planing out the slot under the bottom about a quarter of an inch or more, it kept the neck of the rail from pressing together.

Int. 8. Is there a quarter of an inch or more clearance under the rail when clamped in the jaws of the bayonet-vise?

A. There is little over a quarter.

Int. 9. At the time said bayonet-vise was produced in court, was there then the same quarter or three-eight's of an inch clearance under the bottom of the rail?

A. Yes, sir.

Int. 10. Has it remained the same from that time to the present, and have you worked on it since that time in repairing rails and making frogs, for the past two or more years?

737 A. It has remained the same. I have worked on it ever since, making frogs and repairing rails.

Int. 11. Is the vise fitted for jaws to hold the old T-rail iron and also the fish-plate iron; and do you use the machine for repairing both patterns of rails?

A. I use the machine for repairing both kinds of rails, and remove any jaws for repairing the different kinds of rails.

Int. 12. Does the rail marked "Illinois Fish-plate Rail" correctly represent the rail as used on that road?

A. It does, exactly.

Int. 13. In patching such rail in a bayonet-vise, how is the neck affected by the blows of the hammer in welding and swedging the patch, there being no support to the bottom of the rail.

A. The neck of the rail is not affected.

Int. 14. Will the fish-plates fit to the neck of the rail just as well where the rail comes out of the jaws after the patch has been put on as when it went into the jaws?

A. No, they do not fit quite so well, as sometimes the head of the rail is thickened and the fish-plate will not go on so well.

Int. 15. When the head gets thickened, as you say, what do you do to make the fish-plate go on easy?

A. I take the chisel and cut away under the head of the rail.

Int. 16. In which case does the head thicken up a little under the head of the rail the most—when repaired in the jaws which give no support to the bottom of the rail, or jaws which give support to the rail?

A. It thickens up the most where it rests right on the bottom.

Int. 17. Can you do as much work and just as good work in a vise that gives no support to the bottom of the rail as you can in a vise that does give such support?

A. I can.

738 Int. 18. As a matter of preference, which vise would you choose were you mending rails by the piece and wanted to get out as many inches as possible per day?

A. I would prefer the one that has no support to the bottom.

Int. 19. In cutting off rails where no patching is required, do you use the jaws to hold the rail?

A. No, sir.

Int. 20. Did you use the jaws when you worked on the Illinois Central block which gave support to the bottom of the rail?

A. No. I never used the jaws for cutting off rails.

Int. 21. Why not?

A. We could cut them off handier and quicker on the anvil.

Int. 22. Then you think the jaws are not necessary, whether the rail is supported on the bottom or not in cutting it off?

A. No, sir.

(The complainant objects to each and every one of the foregoing interrogatories, and to the several answers thereto, in regard to the use, or opinion in the use, of the machine with the bottom out, as incompetent and irrelevant to any matters in issue in each of the foregoing cases.)

Cross-examination:

X Int. 1. What countryman are you, and where were you born?

A. I am an Irishman; I was born in Ireland.

X Int. 2. Why do you call the machine constructed like the model, marked "Bayonet-Vise," a bayonet-vise?

A. Because it rises and falls.

X Int. 3. Do you make bayonets on it, or what do you do?

A. I do not make bayonets; I make frogs and mends rails on it.

739 X Int. 4. Did you ever see a machine for making bayonets, and seen bayonets made on it?

A. I never did.

X Int. 5. If any one were to bring you a model constructed like the one marked "Bayonet-vise," and you had never heard any name given to it, what would you call it?

A. I would call it a T-rail block.

X Int. 6. About how heavy is the machine used by you, made like the model marked "Bayonet-vise," and how long are the jaws, and the weight of the moveable part as you change the jaws?

A. The iron-work is about eight hundred pounds. The jaws are about eighteen inches long. I think the jaw would weigh from twenty to twenty-five pounds.

X Int. 7. Was the two sets of jaws produced in court at the trial in October, 1867, made to fit the fish-plate rail in the neck?

A. I cannot say. There was one produced in court then. There was two made for it. I do not remember whether both were produced or not in court.

X Int. 8. Did you ever have any trouble in repairing rails on the machine like the Illinois Central block, before the bottom was taken out, the machine being constructed so as to be perfectly adapted to repair any special pattern of rail?

(Counsel for defendant objects to all the words after the words "the bottom was taken out," as it assumes what is not practicably true.)

A. Well, no; I did not have much trouble, except that before it was taken out the neck of the rail pressed together a little.

X Int. 9. Does repairing rails on the machine you call bayonet-vise affect the flange of the rail in any way?

A. No, sir.

740 X Int. 10. Do you not frequently have to straighten the flange after taking it out of the machine and placing it on the anvil with the head down, by striking on the flange of the rail or platten placed on the flange?

A. No, sir.

X Int. 11. Did you ever repair any rails on what is known by mechanics as a vise?

A. I never used anything except the Illinois Central machine and the bayonet-vise for repairing rails, except I used the angle-iron machine a little while. I never repaired any rails on a common vise.

X Int. 12. How do you know that you can do as much work and just as good work in a vise that gives no support to the bottom of the rail as you can in a vise that does give such support, having never repaired rails in a vise?

A. I have repaired rails in a machine that gives support to the bottom of the rail and one that did not give such support, and I can do just as much and just as good work on the one as I can on the other.

X Int. 13. Do they call these machines vises at the shop where you work, or what do they call them?

A. They call one the Illinois Central block and the other the bayonet-machine.

X Int. 14. Did you ever learn the trade of blacksmithing?

A. I never served a regular time to it.

X Int. 15. What wages do you get per day, and have you had, since you have been to work for the Illinois Central Company?

A. Two dollars and eighty cents per day since the war broke out, and $1.50 per day before the war.

Redirect examination:

Int. 1. You say in your cross-examination that you have used the angle-iron machine a little for repairing rails. Did said machine
741 give any support to the bottom of the rail? If you say it did not, please state how much space or clearance there was under the bottom of the rail.

A. No, sir; it did not give any support; there was about five-eight's of an inch clearance.

Int. 2. Was such a machine produced in court on the trial before alluded to?

A. Yes; it was produced in court at that time.

Int. 3. And did it have the anvil under the rail removed, as you have stated, about five-eight's of an inch?

A. Yes, sir.

(The same objections as in the direct examination.)

Recross-examination:

X Int. 1. Was there a roll attached to one end of that machine for the purpose of having the rail rest on it?

A. No; there was a roller to assist in getting it in and out of the jaws.

X Int. 2. Has that machine been used any since the trial in October, 1867, for repairing rails?

A. No, sir.

X Int. 3. Why not?

A. As we had one stationary, we did not want to be moving it backward and forward.

(Signed) JAMES RYAN.

PETER WORRELL.

Int. 1. What is your name, age, residence, and occupation; do you know the parties to the suit, and how long have you been engaged in your present occupation, and for whom have you been so employed?

742 A. My name is Peter Worrell; my age is 44 years; I reside in Geneseo, in Henry County, State of Illinois; I am a blacksmith; I do know the parties to this suit; I have been blacksmithing about thirty years, but not welding rails; I have worked some ten years in England before I came to this country; about three years in the city of Philadelphia, in Baldwin's locomotive works; two years in the Covington locomotive works, Covington, Kentucky; three years in Marshall, Michigan, for the Michigan Central Railroad Company; twelve years for the Chicago and Rock Island Railroad, at Geneseo; I am still working there.

Int. 2. You say you worked three years in Marshall, Michigan, for the Michigan Central Railroad Company; please state the kind of work you did at that time.

A. I worked about one year on general locomotive repairs, and about two years on repairing shattered railroad iron, or T-rails.

Int. 3. What kind of a block or machine did you use for this purpose, and by whom was it constructed?

A. It was an eccentric block; Joseph Cawood and George Johnson superintended the construction of it.

Int. 4. Who are Cawood and George Johnson; what connection had they with this eccentric block?

A. Cawood was at that time the master mechanic of the repair-shops at Marshall for the Michigan Central Railroad Company; George Johnson was a carpenter and pattern-maker; he worked mostly at pattern-making, and was a resident of Marshall; the patent was taken out in Cawood's name; Johnson made the patterns.

Int. 5. Will you please describe this eccentric block you speak of for repairing rails, and state how it operated?

A. It is a cast-iron block about four feet long; the jaws, I think, are

twenty-two inches wide now, to the best of my knowledge, (they were not so wide at first,) with one fast or stationary and one moveable jaw; it is operated or moved by eccentrics on cam-shafts.

743 Int. 6. Please state how the fixed and movable jaws were adapted to the rail to be held while it was being repaired.

A. The die was formed to fit the outside of the rail; it was made to fit the rail snug under the neck of the rail, and also under the flange of the rail; it was not particular about it fitting exact on the top of the flange.

Int. 7. Do you mean by die, that the jaws were made to fit the bottom and sides of the rail?

A. They were made to fit the bottom; yes, I should say so. They were made to fit the neck.

Int. 8. How high upon the sides of the rail did the jaws come?

A. To within half an inch of the tread of the rail.

Int. 9. Do you mean the top of the rail?

A. Yes.

Int. 10. Do you mean by the words "under the neck of the rail" under the head or tread, as you call it?

A. Yes.

Int. 11. What makes you think that Mr. Cawood deemed it necessary, for the successful working of this eccentric block, that the rail must have a support under the bottom as well as under the head and sides of the rail?

A. He claimed that unless there was a support under the bottom as well as under the head, it would have a tendency to split the rail in the neck.

Int. 12. Please explain how he thought the use of the block in repairing rails would split the neck.

A. It is pretty difficult to state what he thought.

Int. 13. What did he state to you as a reason for insisting on the block being so constructed as to give support to the bottom of the rail while in the jaws for repairs?

A. If the bottom of the rail did not rest firmly on the bottom on the block while hot, the rail would have a tendency to split in the neck.

744 Int. 14. Any other reason why the rail should be supported under the bottom than that it would split the neck if it was not so supported?

A. I have no recollection of any.

Int. 15. Was it or not deemed necessary, both by Cawood, the patentee, and George Johnson, that the rail should have a support under the bottom while in the jaws for repairs?

A. It was.

Int. 16. Were you ever in the employ of said Cawood; if so, what was your business while so employed?

A. Cawood employed me, on behalf of Darius Clark, to go down to New York to introduce the block.

Int. 17. While engaged in introducing the block for repairing railroad rails did said block so introduced give a double support to the rail while in the jaws—that is to say, a support under the bottom and under the head of the rail?

A. It did.

Int. 18. What name did rails go by at the time of introducing this block; and did roads use what is called the fish-plate rail?

A. T-rail. Not to my knowledge.

Int. 19. From your experience in repairing rails on the eccentric or

Cawood block, how was the neck of the rail affected in the operation of repairs on the head, if the rail rested on the bottom and not on the head, alike?

A. It would be impossible to get on a fish-plate without cutting or upsetting the rail.

Int. 20. Supposing there was no fish-plate used, how would the neck be affected—that is, the neck of the T-rails?

A. It would be upset and made thicker or larger under the head and made shorter in the neck.

Int. 21. Since you were employed by Cawood to introduce his rail block, has the fish-plate rail been adopted by various railroad companies; and, if so, what knowledge have you of this matter of adoption?

745 A. It has, very extensively. The Chicago, Rock Island & Pacific is using it exclusively as fast as they can get rid of the old rails.

Int. 22. How long since the Chicago, Rock Island & Pacific Railroad commenced using the fish-plate rail as a substitute for the old T-rail?

A. About seven years, to the best of my recollection. I cannot be positive about that.

Int. 23. Have you repaired on that road the old T-rail and the fish-plate rail; and if so, for how long a time have you repaired such rails?

A. I have; common T-rail for about twelve years; fish-plate about five years.

Int. 24. By contract or by the day? If you say by contract, please state the substance of the contract.

A. By contract or piece. I repair rails at so much per inch, I furnishing all the labor and the company furnish the material. I furnish all repair on tools.

Int. 25. Which is the more difficult to repair, the old T-rail or the fish-plate rail? If you say the latter, give your reasons.

A. The fish-plate; this rail is more liable to get out of form or shape, and unless the neck of the rail is kept in its original shape it is impossible to get on the fish-plate.

Int. 26. Is it necessary to keep the neck of the old T-rail in its original shape; and if not, why not, where no fish-plate is used?

A. For appearance sake, but not for use so long as it is kept plumb and straight, because we use a chair which fits the flange and not the neck.

Int. 27. Any chair used in connection with the fish-plate, or does the fish-plate do away with the use of a chair?

A. It does away with it.

746 Int. 28. What kind of a block or machine did you first use for repairing rails on the Chicago and Rock Island Railroad; and did such machine give support to the bottom of the rail while in the jaws for repairs?

A. The Cleveland machine; it did give support to the bottom of the rail.

Int. 29. What difficulties, if any, did you encounter by having such bottom support?

A. By constant use the top of the dies or jaws would wear off and cause the rail to sink under the head, and make it heavier under the head.

Int. 30. Would not the bottom also wear off; if not, how was the neck affected by the wearing of the jaws when the rail was in the jaws for repairs?

A. The bottom would not wear off; the neck would be upset or shortened between the flange and the head.

Int. 31. How would this upsetting of the neck affect the utility of the rail in the track, provided it was kept in its proper height?

Ans. I allude to the old T-rail; it would make no difference.

Int. 32. How would such upsetting of the neck affect the fish-plate rail when taken from the jaws?

A. It would render it necessary to cut away the superfluous stuff, or swedge it off with tools, or swedge it down.

Int. 33. Swedge what off with tools, and from what part of the rail?

A. The superfluous stuff under the head. I mean iron between the flange and the head.

Int. 34 Have you in your experience in repairing rails found a remedy for this upsetting in the neck while the rail is being patched; if so, what is that remedy, and when did you first discover it and how did you apply it?

747 A. I have. By removing the support from the bottom of the flange, leaving the rail to be supported entirely by the head and neck. It would be hard to tell when I first thought of it. I have been using it in this way for about two years; I applied it by cutting away the block underneath the flange.

Int. 35. What led you to cut away the block underneath the flange?

A. The section men were continually complaining that they could not get the fish-plate on. This is what first led me to it.

Int. 36. Why could they not get the fish-plate on?

A. In consequence of there being too much iron under the head.

Int. 37. Since using the Cleveland block, what other blocks have you used in repairing rails, and what block do you now use at Geneseo?

A. I have used the Cawood and Beebe & Smith, and am now using them.

Int. 38. Please look at exhibit marked Beebe & Smith block, and state whether it correctly represents the block now used by you for repairing rails for the Rock Island and Pacific Road.

A. It does with one exception. I have on mine a little more space between the jaws under the rail.

Int. 39. Is the bottom removed as seen in the model; if so, what part of an inch clearance is there underneath the rail?

A. It is. There is $\frac{3}{8}$ of an inch.

Int. 40. And is this $\frac{3}{8}$ of an inch clearace a remedy for your former difficulties of upsetting the neck? If you say it is, give your reasons.

A. It is; because the rail rests entirely by the head and neck, which prevents it from upsetting.

Int. 41. Does or not the same reason apply to the Cleveland block, the Cawood block, and to any other block with which you are acquainted for repairing railroad-rails?

A. It does.

748 Int. 42. Can you or not do more work per day in a block which gives no support to the bottom of the rail or in one which does give such support? If you say you can do more work, state how much more, and give your reasons for the conclusion.

A. I can do more work in a block which gives no support to the bottom of the rail. I cannot state exactly how much, as I have not tested it. It saves the amount of time taken up by removing the superfluous iron under the head of the rail when upset.

Int. 43. Am I or not to understand that the neck of the rail is not up-

set at all in putting on a patch when the rail is suspended in the jaws without a support to the bottom?

A. It is not upset when so suspended.

Int. 44. Then the neck of the rail comes out of the jaws in just the shape that it went in, does it?

A. It does not materially alter it.

Int. 44. How many more inches of patching can you do in a day, according to your best judgment, by reason of your not having any surplus iron to remove from the neck by upsetting the same when support is given to the bottom of the rail compared with a block which gives no support to the bottom?

A. I could make at least twenty inches. I cannot tell exactly.

Int. 46. How many inches then were you in the habit of putting on per day of ten hours, in a block which gave support to the bottom of the rail, and how many inches in a block which gave no support, whether it be the old T-rail or the fish-plate rail?

A. I do not see that it can make any difference in the old T-rail. I have already stated that it makes about twenty inches in the fish-plate rail. The amount I can do is my own business. I do not see as any one has anything to do with the amount I can do.

749 Int. 47. In using the different blocks which you say you have in repairing rails, would or not dirt or cinders accumulate on the bottom or part upon which the rail rested, and thus throw the head above the top of the jaws, and thus cause the neck of the rail to be upset when the patch was welded upon the head.

A. It would, unless care was used to keep the block clean, and also in removing the rail from the fire to the block.

(The complainant objects to each and every one of the foregoing interrogatories, and to the several answers thereto in regard to the use, or opinions in the use, of the machine with the bottom out, as incompetent and irrelevant to any matters in issue in each of the foregoing causes.)

Cross-examination:

X Int. 1. Did you not always, when necessary to remove any cinders from the bottom of the block after repairing a rail, do so with a broom before putting another rail into the block to be repaired?

A. We make it a point to do so.

X Int. 2. You are asked in your direct examination (interrogatory 46) how many inches were you then in the habit of putting on per day of ten hours, in a block which gave support to the bottom of the rail; what was your average day's work then in feet and inches for the Rock Island road?

A. I do not know that I am here to tell how much I make per day; that is my own private business.

X Int. 3. Do you know whether you are to testify to the truth and the whole truth, and have you not been sworn to so do to all questions put to you; and do you know in whose behalf you are brought here to testify; whether for the defendants to these suits or the plaintiff?

A. I do know. I have. I did not know till I got here who sent for me.

X Int. 4. Who have you learned sent for you since you got here, and for whose behalf have you been testifying to on your direct examination?

750 A. I received a dispatch from Mr. Hall, our superintendent, to come here as a witness, and did not know in whose behalf nor

what the business was. I have been testifying to the truth, as far as I know it. I can only judge from what has taken place since I got here and the questions which have been asked me, and from the parties present. I presume the parties to this suit are the Michigan Southern Railroad Company and Mr. Turrill. The direct examination has been in behalf of the Michigan Southern Railroad Company.

X Int. 5. What price per inch or foot are you getting, or have been getting, where you have been working for the Rock Island Road patching rails, for the labor?

A. Three cents per inch at the present time. I do not now remember how long I have been getting this price. The prices have raised. I have welded for two and a half cents per inch in the center, and two cents per inch for ends.

X Int. 6. How many men do you use at each fire; what are the wages of the same per day; what kind of a fire do you use, and what amount of fuel do you use per day at each fire?

A. Sometimes three and sometimes four, according to necessity. I pay $1.75 for the helpers per day, and from $2.50 to $2.75 per day for the foremen. I use a box-fire, with Blossburg coal; common blacksmith's bellows. The amount of coal varies according to the quantity and quality of the work to be done.

X Int. 7. How much coal does it ordinarily take in patching 300 inches, as you ordinarily patch?

A. I should think about four bushels.

X Int. 8. About how much does the coal weigh per bushel?

A. About sixty pounds a bushel when dry.

X 9. What thickness and width of iron do you use in repairing rails?

Ans. All the way from three-eight's of an inch up to one inch thickness, and two inches in width.

751 X Int. 10. Do you use, as a general thing, as thick iron in repairing the fish-joint rail as you did in repairing the old T-rail?

A. Yes.

X Int. 11. What was the length of the rail, height of the rail, and weight per yard of the old-fashioned T-rail that you repaired for the Rock Island Railroad Company?

A. The length was from 15 to 24 feet; the height 3¼ after they were worn down; they were originally 3⅜ inches in height; they vary, however, from 3⅜ to 3½, and weigh about 60 pounds to the yard.

X Int. 12. What is the length of the fish-joint rail; its height, and the weight of the same per yard?

A. From 24 to 28 feet; its height from 4 inches to 4¼; its weight from 70 to 75 pounds per yard.

X Int. 13. Is the new fish-joint rail of the same height, that you have been repairing for the past two or three years, as it was when it was first introduced on the road?

A. It is.

X Int. 14. Did they have different heights when it was first introduced; if not, when was it changed?

A. They did; they are using all four-inch rails now, those they are getting new.

X Int. 15. What portions of the head or thread of the rail required the most repairing, the end or the points between the two ends of the old-fashioned T-rail?

A. I think the ends.

X Int. 16. What would be a fair proportion as the ends of the rail and what are termed the centers?

A. About one-fifth centers.

X Int. 17. At what places on the fish-joint rail usually require the most patching, the ends or what are termed the centers?

A. The inches are about the same, but the number of ends would be most, as there are two ends to each rail.

752 X Int. 18. Is the ends of a fish-joint rail supported by fish-joints more or less liable to break away than the balance of the thread of the rail?

A. I do not think there is much difference.

X Int. 19. In repairing a rail, on what occasions do you have to use four men, as you have spoken of?

A. On the centers.

X Int. 20. Is the center more difficult to repair than the ends; if so, why?

A. They are more difficult to handle; there is no difference in the heating or molding.

X Int. 21. By the railroad company introducing the fish-joint rail, does it save them the expense of buying chairs to secure the rail, as they had to do with the old-fashioned T-rail?

A. The fish-plate take the place of the chair.

X Int. 22. When rails are laid in the track, are the ends where they are connected of equal height, or is one end of the rail lower than the other end in either of the rails you have spoken of?

A. They are, or ought to be, even.

X Int. 23. Then in repairing the old T was it not necessary that the ends of the rail should be of the same height when connected together; if they were not, how did they remedy that in laying them in the track?

A. It was necessary for them to be of the same height, and we kept them of the same height over all; in repairing rails we always left them at the original height; where they connected a different height of rail they had a chair, which raised the lower rail equal in height to the higher rail, which was a cast-iron chair with an offset in it equal to the difference of the height of the two rails.

X Int. 24. How many fires are you operating at the present time, and how many have you been operating since your connection with the Rock Island Railroad?

753 A. Three at the present time. We have varied according to the amount of work on hand. I do not calculate to keep any idle men around.

X Int. 25. Did you ever operate more than three? If so, for how long?

A. No.

X Int. 26. Are there three machines now in use and operated by you in repairing rails like the model referred to, in every particular, marked "Beebe & Smith machine?"

A. I am, at present, operating two Cawood machines and one Beebe & Smith. The Beebe & Smith is like the one referred to in every particular.

X Int. 27. How long have you used the Beebe & Smith machine, and how many different machines have you used since you have repaired rails for the Rock Island Railroad of that pattern?

A. About 10 years. The block is the same, except that we have jaws to different rails.

X Int. 28. How long does it take the jaws in a machine to wear away

on top so that it will not fit properly a special pattern of the rail for which they were made?

A. They begin to go in about three months, and get worse, of course.

X Int. 29. What causes the jaws to wear away that supports the top of the rail under side of the crown?

A. The use of them.

X Int. 30. What use or office do the jaws perform that support the rail on the under side of the crown; is it any more than to keep the rail in a proper shape as the jaws are so formed for a special pattern of rail?

A. The jaws support the rails during the operations of welding, and to keep the rail up in its place.

X Int. 31. Does any of the blows from the hammers and sledges, in patching, come in contact with the jaws on the under side of the crown or tread of the rail?

754 A. No.

X Int. 32. What, then, causes them to wear away, they being made of cast iron and the rail being heated to a very soft heat for welding, when placed in the jaws?

A. The head of the rail is so light that it does not break off the full force of the blows. As the rail is worked it becomes cooler, and in swedging up a rail it has considerable effect on the crown of the jaws.

X Int. 33. Do you, in patching rails, after the patch has been put on, put it in the jaws of the machine, after it has become partially cold, and top-swedge it again, so that the part patched should be of the same height of the balance of the rails?

A. Not always. We occasionally do when the rail requires it.

X Int. 34. Did you ever repair rails on a common anvil or swedge block of any pattern?

A. No.

X Int. 35. Supposing you discard the jaws and have nothing but a bottom support to the rail while patching, what would be the effect on the first joint-rail while being so patched?

A. It could be done, but not successfully.

X Int. 36. Have you ever given a deposition for any one? If so, when, about matters relating to the Cawood patent?

A. No, sir; I have not.

X Int. 37. Did you not come from Geneseo to Chicago, in the year 1861 or 1862, to give your deposition in favor of S. H. Turrill and Charles Wormley against the Michigan Southern and Northern Indian' Railroad, and also the Illinois Central Railroad?

A. I came here in 1861, to the office of Hoyne, the commissioner, about the 26th of December, and gave a deposition in regard to welding rails, but not, as I understand, about Cawood's patent-right; and in answering the previous question I understand it to have connection with the Cawood patent-right and not to the suits now pending.

755 X Int. 38. Having heard read by the commissioner the deposition or certified copy of same given in December 26, 1861, do you wish now to change any of the answers to the interrogatories in that deposition?

A. I think that experience has taught me that the Beebe & Smith block has some advantages over the others; that is all that I know of that I wish to make any change.

X Int. 39. How do rails that have been patched wear in the road in comparison with the rails which have not been patched?

A. The patched part generally outwears the balance of the rail.

Direct examination resumed:

Int. 1. In looking over direct examination, I observed that I had not called your attention to the quality of the work done in blocks, or vises, which give no support to the bottom of the rail, compared with the work done in blocks which do give such support; what have you to say on this point? Whatever your statements may be, please give your reasons for them.

A. The work done in blocks without the bottom support is superior, for the reason that the rail comes out of the block in its original shape, obviating the necessity of trimming or working, and consequently there is less liability to split the neck of the rail.

Int. 2. Having read your deposition of December, 1861, in what respect does the Cawood, and Beebe & Smith block, used by you, differ at the present time compared with the same blocks used at the time said depositions were taken?

A. They differ only in being adapted, or made to fit the fish-plate rail; we were not repairing any fish-plate rails in 1861.

Int. 3. In adapting the different blocks to repair fish-plate rails, what alterations have you made in the blocks, touching the support of the rails while being repaired?

756 A. We have cut away the support from the under side of the flange of the rail.

Int. 4. In how many blocks and by what name is these blocks known?

A. In two blocks; one Beebe & Smith and one Cawood.

Int. 5. Are you also using what is called a Cleveland block; if so, has the support to the bottom of the rail been removed from it?

A. We are not using the Cleveland block at the present time; it is broken, and we have never repaired it for use.

Int. 6. Were you to repair it for use, would you take out the metal under the flange of the rail, so as to give no bottom support to it?

A. I would, every time.

Int. 7. Do you or not consider that the patent from the Cawood block requires support to the bottom of the rail?

A. I cannot now state positively what he does claim. I know that he always made that point to bear on the bottom.

Int. 8. Has or not your experience taught you since you were engaged by him to introduce his block, that the bearing of the rail upon the bottom is not necessary in repairing the rail while in the jaws?

A. It has taught me that it is injurious.

Int. 9. Please give your reasons why such support is injurious.

A. Because it causes the rail, in case the block is worn on top, to sink down and prevent the fish-plate from fitting properly, unless the superfluous iron is cut away.

Int. 10. In all the different blocks which you have used in patching railroad-rails, what have you to say touching the point of cutting off the rails where no patching is required; do you or not use the jaws to hold the rail for this purpose?

Int. 11. And would such be your answer, whether the rail had a support under the bottom or not?

757 A. It would; I should not use the jaws in either case.

Recross-examination:

X Int. 1. Did you ever use the jaws for cutting off rails; if yea, up to what time did you discontinue the use of them?

A. I have occasionally. I never used them exclusively, only occasionally. I do not remember when I ceased to use them.

X Int. 2. What are you allowed by your contract in feet and inches for cutting off rails and squaring them up?

A. It is allowed 4 inches for the old common T-rail, and 8 inches for the fish-plate rail.

Redirect resumed:

Int. 1. What number of inches per day of ten hours, on an average, you consider a fair day's work for a smith and two helpers, in a block that gives support to the bottom of the rail; I mean the fish-plate rail?

A. They vary according to the men. I have had men that welded 150 inches a day, and some that could weld 250 inches per day, perhaps more.

P. WORRELL.

DANIEL FERENBECK.

Int. 1. What is your name, age, residence, and occupation, and how long have you been so employed, and for whom?

A. My name is Daniel Ferenbeck; my age 26 years. I live in Toledo, Ohio. I am a blacksmith about 18 years. I worked in Germany nearly two years, and one year in Pittsburg, in the rolling-mill; then for the Michigan Southern and Northern Indiana Railroad for the past 18 years. I am at work for them still at Toledo, Ohio. I worked nearly 5
758 months on the track, nearly 4 years in the shop in Sturges, Michigan; nearly 5 years in the shop at Adrian, Michigan, and nearly six years at Wauscon, Ohio, making the 15 years I have worked for this company.

Int. 2. What kind of work did you do at Sturges, Adrian, and Wauscon?

A. Mending railroad-rails, and keeping in repair the tools for the trackmen and for the shop.

Int. 3. For the six years you have worked at Wauscon, what kind of a machine or block did you use for repairing railroad-rails?

A. That kind. (The witness here pointing to the exhibit before him, marked "Beebe & Smith's block.")

Int. 4. Have you repaired on that road both the old T-rail and the fish-plate rail?

A. Yes, sir.

Int. 5. When and where did you first commence repairing the fish-plate rail?

A. In Wauscon, Ohio, about six years ago, I commenced to repair some; this was when I first went there.

Int. 6. Did you have any trouble in repairing the fish-plate rail in the Beebe & Smith block as you found it when you went there? If you say you did have trouble, state what it was.

A. I did; by resting on the bottom it upset the neck, and closed up the holes where the bolts go in.

Int. 7. Do you mean that the rail rested on the bottom of the flange, and that the holes in the rail when the patch was put on were closed up?

A. Yes.

Int. 8. How did you obviate this trouble of upsetting the neck of the rail and closing of the holes?

A. By chipping the block out.

Int. 9. Look at model Beebe & Smith block, and say where you chipped it out, and how much you chipped it out—what part of an inch?

759 A. I chipped it out under the bottom of the flange about three-eighths of an inch.

Int. 10. What tools did you use for chipping out the block, and how long were you engaged in doing it?

A. One sledge and one cold-chisel. I was nearly four hours doing it.

Int. 11. Was this some six years ago, and did you use the block so chipped out during the whole time you were at Wauscon in repairing rails?

A. Yes, sir; yes, sir.

Int. 12. How was the neck of the rail affected as to the upsetting and closing of the holes after the support under the bottom of the rail was chipped out?

A. It was not affected. It come out just as it went in.

Int. 13. What amount of work, in inches, do you consider a fair day's work for a smith and two helpers on a Beebe & Smith block, the bottom support being chipped out and the rails to be repaired of the fish-plate pattern?

A. Well, about 208 inches per day.

Int. 14. Will the same help do more or less work in a Beebe & Smith block, the bottom support to the rail being in or chipped out?

A. In one chipped out.

Int. 15. In your judgment, how much more inches per day?

A. Well, that fellow said yesterday about 20 inches. I should say about 30 inches.

Int. 16. Why, in your judgment, can the same help do 30 inches more?

A. Because I will not have so much trouble by upsetting the neck and closing up the holes.

Int. 17. What is the quality of the work done in the block without support compared with the block which gives support to the under-side of the flange of the rail?

760 A. It is the best on. I understand the question good enough.

Int. 18. Why is the work the best when done in a block with the bottom support out in repairing the fish-plate iron?

A. Well, the upsetting the neck and closing up the holes having a good deal of trouble in punching out the holes by splitting the throat or neck.

Int. 19. Do you or not mean by this answer that when the fish-plate rail is repaired in the block which gives support to the bottom of the rail that the neck is upset and the holes closed and that you have to open the holes and follow out the neck in order to make the fish-plate fit? And do you or not mean to be understood that you do not have this trouble after the bottom is chipped out of the block as seen in model exhibit marked "Beebe & Smith block?"

A. Yes; so far as I understand it, it is a good deal more work. By being too much it will split the throat or neck. No, I will not have so much trouble with the bottom chipped out.

Int. 20. Do you use the jaws to hold the rail in cutting it off when no patch is to be put on in either case; and I mean by this whether the block gives support to the bottom of the rail or not?

A. I do.

Int. 21. Why not?

A. There is no need of it.

(The complainant objects to each and every of the foregoing interrogatories, and to the several answers thereto in regard to the use or opinion in the use of the machine with the bottom on, as incompetent and irrelevent to any matters in issue in each of the foregoing cases.)

Cross-examination:

X Int. 1. How many machines have the Michigan Southern and Northern Indiana Railroad in use or had in use in these places you have spoken of, or in any other places on the line of the load?

761 A. All I have seen is four different kinds. At Sturges there was two old common anvils and one screw-block; at Adrian there was four Cleveland blocks, and at Wauscon there was two of the Beebe & Smith machines. I have not seen any others on the line of the road. I took one of the latter down to Toledo with me when I went there.

X Int. 2. What wages have you and your helpers received per day, and how many men are employed at each fire, and the kind of fire used; what amount of coal do you use at each fire per day?

A. I am not obliged to tell what I am paying; from 12 to 14 shillings to helpers; blacksmiths from 15 to 22 shillings; I mean at 8 shillings to the dollar; four men at each fire at Wauscon; coal fire, with the common smith's bellows; sometimes use about three and a half bushels per day.

X Int. 3. Did you keep an account of the feet and inches repaired per day on the rails?

A. Yes, sir.

X Int. 4. To whom did you return that account, and how often?

A. To Charles Payne and H. M. Wright; once a week.

X Int. 5. What position does Charles Payne and H. M. Wright hold on the road?

A. As far as I know Charles Payne is the chief engineer; Mr. H. M. Wright is superintendent on the air-line division.

X Int. 6. How many inches per day is the most that you have known being welded in machines by one set of hands—one smith and two helpers—at one fire; or how much have you ever done in one day?

A. Well, I have put on over 300 inches in one day; I never knew any one to put on more than this; there is a good deal of blowing of others putting on more.

X Int. 7. How many rails have you averaged per day of mending, while you have been employed by the company, at one fire?

762 A. I cannot answer exactly how many; should think about eleven a day would be about a fair average.

X Int. 8. About how many inches have you put on rails as an average?

A. Say about eight inches.

X Int. 9. You say you repair eight inches on each rail, and eleven rails per day; how many inches is that per day?

A. That would be 88 inches per day; some days I put on more. I have averaged about 208 inches of the fish-joint rail per day.

X Int. 10. Did you repair more in inches per rail upon the old T-rail than you have upon the fish-joint rail?

A. Yes, sir.

X Int. 11. How much did you ever put upon one rail in inches for repairs?

A. Fifty-two inches on one rail.

X Int. 12. What were you allowed to repair in feet or inches on the old rail that needed patching?

A. We had no order, except to mend such rails as would pay for patching.

X Int. 13. How many inches on a rail would pay for repairing, as you mended rails?

A. At first we mended them up very close; now we do not put on more than two feet on an end, or one patch.

X Int. 14. How much did you use to put on, when you mended them up close, in inches?

A. We sometimes put on from four to six feet to one rail.

X Int. 15. Then when you used to repair the old T-rail, before the fish-plate rail was introduced, the average per rail would be considerable more in inches, would it not, on account of mending them up closer?

A. Yes.

X Int. 16. About how many more did you used to average on the old T-rail, per rail, when you mended them in a machine?

763 A. I used to average about 250 inches. I cannot answer that; some rails we put on more and some less.

X Int. 17. Would the average be 2 feet, or 2½ feet, or 3 feet to the rail on the old T-rail as you repaired them?

A. I should judge about 2 feet.

X Int. 18. What was the length and height of the old-fashioned T-rail that you repaired?

A. All that I repaired is from 15 to 21 feet; the height is 3½ inches; some were a little less.

X Int. 19. What is the length and height of the first rail used on your road?

A. From 21 to 27 feet long; the height is 4 inches; some a little less.

X Int. 20. What width and thickness of iron have you used in repairing rails?

A. Two inches wide, from ¾ to 1 inch in thickness.

X Int. 21. Did you have different sets of jaws to fit different patterns of rail?

A. We had two sets of jaws, one set for the old T-rail and one set for the fish-plate rail, as the fish-plate rails were all 4 inches high when they were new.

X Int. 22. Look at model marked "Beebe & Smith block," where the jaws are open, and are not the edges of the blocks which come together on the bottom a little higher than the bottom which represents the anvil underneath the jaws, and is not a rail very apt to bind in getting into the jaws and out of them after being repaired, the jaws working in the arc of a circle?

A. I had a good deal of trouble in that, too, and that is one reason why I chipped that out at the bottom; but I did not chip it out entirely for this reason.

X Int. 23. When you chipped out this block did you chip off the edges of the bottom of the anvil where open, so that they would be as low or a little lower when the block is open than the anvil back under the jaws?

764 A. I did chip off the edges, but I could not get a chisel in under the jaw to chip it off so much.

X Int. 24. How long are the jaws in the machine that you chipped off, and what are they made off?

A. I cannot tell exactly; as near as I can judge, about two feet; they are made of cast iron.

X Int. 25. Then all the chipping off you done to the jaws was performed in four hours with a cold-chisel and sledge, was it?

A. Yes.

X Int. 26. Is cast iron easy or hard to chip off with a cold-chisel?

A. Some castings are hard and some are soft. That was soft; it was heated so much. (The witness referred to the model.)

X Int. 27. Have you ever repaired rails on what is called the common anvil or wedge-block, with grooves on the face of the same?

A. Yes, sir; I used one nearly four years.

X Int. 28. Could you repair the fish-joint rail on the common anvil and make it a successful business?

A. I could mend them if it had to be done, but I could not do many of them.

X Int. 29. What would be the effect upon the fish-joint rail if you repaired it with nothing but a bottom support; could you repair it so as to put the fish-plate on and make it a useful rail to the company?

A. It would upset the neck. Yes, I could repair it if it had to be done, but it would not pay; I could not get many done.

X Int. 30. After the neck was upset, in following it up to its proper height after patching it, would it not split the neck, it being so much thinner than the old-fashioned T-rail, consequently cooling quicker?

A. Some of them would split and some would not.

765 X Int. 31. How is the Michigan Southern and Northern Indiana Railroad repairing their rails at the present time, and how long have they been so repairing them?

A. They have a machine to roll the patch on. I cannot tell how long; it is over a year.

X Int. 32. Have you seen that machine work in rolling the patch on?

A. I have not. I have seen the machine.

X Int. 33. Where is the machine located?

A. At Elkhart, Indiana.

X Int. 34. Have you been in the shop at Elkhart since the machine was put up there for rolling the patch on, during working-hours?

A. It was first put up; I was at Elkhart but the machine was not working.

Redirect:

Int. 1. Why can you do more work in a day patching the old T-rail than you can the fish-plate rail?

A. I can mash it down or upset it in the neck more.

Int. 2. When you have knocked it down or upset it, do you let it stay down?

A. Yes, sir.

Int. 3. Then it will not do to knock down or upset the fish-plate rail, will it? If not, why not?

DANIEL FRENBECK.

THOMAS WHITE.

Int. 1. What is your name, age, residence, and occupation, and how long have you been so employed, and for whom?

766 A. My name is Thomas White; my age, 36 years; I reside at Bloomington, Ill.; I am road-master of the Chicago, Alton & St. Louis Railroad; I have been so employed for about five years; I have been on what is known as division 3 of said road.

Int. 2. Are railroad-rails patched on this division; if yea, at what place?

A. Yes, sir; at Bloomington.

Int. 3. Please describe the machine or tool for holding the rail while being patched.

A. Well, we have the form of a vise without any support underneath the bottom of the rail, but the rail is supported under the head of the rail in the jaws of the vise.

Int. 4. Please look at the model marked "Ft. Wayne Vise," and state what it is, if you know.

A. It is a correct representation of the vise used by us for repairing railroad-rails, except that it is placed on a block instead of legs. The bearings of the machine are essentially the same.

Int. 5. In what respect, if any, does the vise you now use differ from the one used six months or more since?

A. Well, take this one that we have been using as a model, and put in a bottom support for the rail, and it is just the same as what we used before.

Int. 6. You speak of putting in a bottom support to the rail; have you at any time, if yea, when, removed this bottom support from this vise?

A. Yes, sir; we removed it about the middle of September.

Int. 7. About how much did you remove from the bottom or rail-seat of the vise?

A. About one-half to five-eighths of an inch.

Int. 8. Is there an account kept at the rail-shop in Bloomington of the number of rails repaired, and a report of the same made to you both before and after the alteration was made?

767 A. Yes, there was.

Int. 9. Can you furnish such report, or rather the number of rails repaired in a given time, both before and after the alteration? If yea, please give the substance of that account as part of your deposition, and from whom you received this report.

A. I can; there was repaired at one fire, in the machine without bottom support to the rail, in the month of October, 1869, 409 rails; in August, by the same fire and same men, there was repaired, in a vise with a bottom support, 411 rails; in fourteen days in November, there was repaired, at the same fire and by the same men, in a vise without a bottom support to the rail, 225 rails; in fourteen days in June, by the same men and by the same fire, there was repaired, in a vise with a bottom support, 221 rails. I received the report monthly from Mr. James Flavin, at that time foreman of the rail-fire, and from Mr. James Box, who is now foreman.

Int. 10. Have you or not observed the work done in the vise with a bottom support, and the same without a bottom support, as it has come on the road to be laid down? If so, give your experience and knowledge in this matter.

A. Yes; I have seen the work done with both machines; the work done with a machine with a bottom support to the rail, the rails came on the road with the neck drawn down, so that the fish-plate could not be put in without chiseling it out. Since we got this bottom support taken out, it obviates all this difficulty, and when the rail gets down on the road, we put it right in the track then; no chiseling is required since the support is taken out underneath.

Int. 11. How many machines have been altered under your direction?

A. Five.

Int. 12. What further orders, if any, have you received in relation to altering any other machines used upon the line of the road?

A. I have instructions to alter all the machines used on the road.

768 Int. 13. From whom did you receive these instructions?

A. I received them from Mr. McMullen, the superintendent of the road, and from Mr. Booth, chief engineer.

(The complainant objects to each and every one of the foregoing interrogatories, and to the several answers in regard to the use, or opinions in the use, of the machines with the bottom out, as incompetent and irrelevant to any matters in issue in each of the foregoing cases.)

Cross-examination:

X Int. 1. What are your duties as road-master, and what is required of you by the company?

A. I superintend all the work on the division, under instructions from our chief engineer, to see that all work is done in proper shape and kept in good condition.

X Int. 2. Do you superintend the blacksmithing?

A. A part of it; as far as the rail department goes, and the repairs of tools for that division.

X Int. 3. Do you attend personally to the putting in the track all rails that are repaired?

A. As a general thing I am out a good deal amongst them.

X Int. 4. What do you call the machine or tool that you repair rails on?

A. A vise.

X Int. 5. When did you first hear that name given to it; and is that what the men call it that work on it?

A. About four or five months ago. It is at the present time.

X Int. 6. Why do you call it a vise at the present time?

A. Well, it acts in the same capacity, and they cannot well call it anything else.

X Int. 7. When did you first become acquainted with S. N. Whipple?

A. About three or four months ago; perhaps about four months.

769 X Int. 8. Under what circumstance did you make that acquaintance?

A. He came down to see me about the swedge-block or vise business; it was at Bloomington; I met him at the depot.

X Int. 9. What object did he have in seeing you about this swedge-block or vise business, and what did he say to you at the time?

A. He asked me about the fires I was running, and told me that he thought he could make an improvement in this vise we have been using. I done so, and went down to my shop with Mr. Whipple. I think Mr. Whipple went along down with me when we made this change, and I see some rails repaired there at the time.

X Int. 10. What did he say the object or reason was for making this improvement that you speak of?

A. He did not say anything to me about it.

X Int. 11. Has any one else ever stated the object or reason to you for making this change or improvement?

A. No, sir; when Mr. Whipple came down to Bloomington he had a letter from Mr. Booth, chief engineer, ordering this change to be made.

X Int. 12. Have you ever heard any one say what the reasons were for making this change?

A. No, sir.

X Int. 13. Have you paid more or less attention to the repairing of rails since this improvement, and how much of your time is spent in the rail-shop?

A. Well, no; just about the same as I have done heretofore; some days I spend a couple of hours, and some days I cannot get there at all; some days an hour or two.

X Int. 14. When did you first know that you would be expected to give your deposition in this matter?

A. About a week.

X Int. 15. Did he state to you then what the objects was, and the reasons why he wanted you to give your testimony?

770 A. No, sir.

X Int. 16. Did you know from any person what would be required of you?

A. No, sir.

X Int. 17. Has any one stated to you the reason why they wanted you to produce the several accounts which you have in your direct examination, showing the amount of labor done in the machine with the bottom out and the amount done with the bottom in; if so, whom?

A. Yes; Mr. Whipple asked me if I kept a record of the work done.

X Int. 18. What did he state to you was the reason he wanted to know this?

A. He wanted to know which was the best way of doing this; whether he could gain or lose on it he did not state.

X Int. 19. What did you infer the object was from what he said to you?

A. I did not make any calculations on it when the change was made; I did not think what he wanted, except to see the amount of work which was done in the summer months.

X Int. 20. Did you know, or have you heard from any one, and from whom, and where, and when, that the Chicago and Alton Railroad Company had been sued for using this machine for repairing rails, or any other company?

A. I have heard of it, about a year and a half ago, probably from W. T. Ragland, of Bloomington, was the first man that told me of it; I was at Bloomington.

X Int. 21. Have you heard it from any others; if so, from whom, and when?

A. Not that I recollect of.

X Int. 22. When you came here to give your testimony, did you not know you was to give it on behalf of the Chicago and Alton Railroad Company and others, as against this patented machine?

771 A. No, sir.

X Int. 23. Who did you expect to give it for, and for whose benefit?

A. For no person's benefit. I came to tell the truth and no more for no party.

X Int. 24. What do you think was the object of Mr. Whipple in wanting you to give your testimony from what he said to you at any time?

A. Well, I had been one of the first to make the change in that block, and had had more experience than a good many more of them; he wanted my testimony to know which way we were doing best; this is my supposition; Mr. Whipple did not say anything to me about it.

X Int. 25. What do you mean in your last answer by saying you had more experience than a good many more of them?

A. Well, when I say a good many more of them, more than any of the road-masters on our road, and to see that this 'hange had been satisfactory since it was done.

X Int. 26. How many different kinds of patterns of rail do you use in your division of the Chicago and Alton Company, and what are their heights and configurations and weight of the same per yard?

A. Five, I think; they run from three inches, I think, to four and three-eighths inches; this is the highest rail we got; some of them is a common T-rail and some the fish-joint; these are all we have. I think

our lightest iron is fifty-four pounds and the highest sixty-five pounds per yard. I am not positive.

X Int. 27. What is the difference in the height of the fish-joint rail, and is there as good iron in them as the old-fashioned T-rail, and do they wear as well in the road?

A. Three-eighths of an inch; no, sir; no, sir; the material is not in them; we cannot get as good iron as we used to get.

772 X Int. 28. About what quantity of each kind and height have you in your section of the road, and which have you the most of, the high or the low, of the fish-joint rail?

A. About 10 miles of four-inch rail, 35 miles of $4\frac{3}{8}$ inch rail; this is all the fish-joint rail I have.

X Int. 29. Which kind requires the most mending at the present time?

A. The $4\frac{3}{8}$.

X Int. 30. Is not that very difficult iron to mend on account of its being so brittle and thin in the neck and liable to split in the neck while patching?

A. The iron is very difficult to repair as regards patching; but then the iron is not brittle; it is not liable to split in the neck while patching, except when you punch the holes, then you will split it every time.

X Int. 31. Why do you have to punch the holes?

A. We don't have to do much of it now; when the neck becomes depressed we have to get a punch to open the holes.

(Witness here referring to model marked "Fort Wayne Rail.")

X Int. 32. Have you ever had much of it to do; if so, why?

A. Yes, a good deal. The rail would get depressed, and we had to open the holes by having the bottom bearing; (witness here puts model rail marked "H" into model marked "Ft. Wayne Vise;") the neck of the rail gets depressed while patching, consequently you have to take your punch and open those holes, and split the neck of your rail by so doing.

X Int. 33. At what temperature do you have to heat the rail to put on the patch?

A. We have to get on a welding heat. I do not understand—you have to get on a soft heat.

X Int. 34. When you get this soft heat on and put it into a machine adapted for mending one special pattern of rail, the jaws coming up and fitting the sides of the rail to the center of the crown or head of

773 it having a bottom support, do you, in patching, drive the neck down between the jaws and upset it?

A. Yes; it is going to settle down some, and it is going to shrink some.

X Int. 35. Will it settle down enough to close the holes in the rail?

A. Not altogether; but you have to use a punch to open them, though.

X Int. 36. Then it does drive down in the neck of a rail when in a machine, as referred to in cross-interrogatory 34?

(Question objected to, as the witness is not introduced as an expert.)

A. Yes, sir; driving down and the skrinkage of it.

X Int. 37. How much would be the shrinkage of a railroad-rail under that state of affairs?

A. Probably it might run down from a sixteenth to an eighth or half an inch. I have seen it run down to half an inch, when the holes are closed up.

X Int. 38. Does the rail, when it has no bottom support, change in

any way below the crown of the rail while being patched in this soft state?

(Same objections repeated.)

A. I have not seen any, and I have watched the thing pretty close all through.

X Int. 39. Do you keep an account, or is the account kept by the foreman of the T-rail shop, delivered to you, and how often; and does that account show the number of rails patched and the amount of patching done on them?

A. The account is kept by the foreman of the T-rail shop, and delivered to me the first of the next month; it does not state the number of inches patched on each rail; it shows the number of rails patched.

X Int. 40. Does it show the number of inches patched each month in any way?

A. No, sir; we know the amount of iron we use.

774 X Int. 41. How much iron does it take to do a foot of patching, and are the fractures of the rails the same in all cases, and what thickness and width of iron do you use for the purpose of patching rails?

A. It takes about 3½ pounds of a bar, that is two inches (2) by five-eighths, (⅝.) I have weighed it several times; I think this is it. The fractures are not all the same; sometimes we can use ½-inch iron, sometimes ⅝, sometimes ¾ inches; we use 2 inches in width by ½; ⅝ and ¾ is the general size we do use.

X Int. 42. What portion of the head of the fish-joint rail requires the most patching at the end or between the ends?

A. Well, there is no particular point; it gives out about as much at the center of the rail as it does at the ends.

X Int. 43. Do you think you are doing as much work on your division of the road as on other divisions of the road in patching rails, and as the other roads generally do with the machine?

A. I cannot tell about the other divisions of the road; we are doing pretty good work, and getting out 18 to 20 rails a day. I will average 16 to 20 rails per day.

X Int. 44. Do all rails require the same amount of patching on them? If not, how much do you put on them?

A. No, sir; they run all the way from three inches to two or three feet, and five feet, if you want to put it on.

X Int. 45. Consequently, some months you repair more amount of rails than other months, do you, owing to the difference to the amount of patching you put on them?

(Objection.)

A. Yes.

X Int. 46. Do you employ practical blacksmiths to repair or patch rails, or only what they would term rail-patchers, who have never learned the trade of blacksmithing?

775 A. I have one practical blacksmith; the others are rail-patchers; one of them, I think, has served his time as blacksmith. James Box is a practical blacksmith and James Flavin is a rail-patcher.

X Int. 47. How many rail-fires have you on your division, and where are they located?

A. Two. At Bloomington.

X Int. 48. How long since you commenced patching rails—the fish-joint—on your division?

A. About five years.

X Int. 49. Does the part patched or the rail wear better or not than rails that have not been patched?

A. I think not.

X Int. 50. Why not; is not the iron that you patch with better than original rail?

A. I consider that it is; but you cannot get an even temperature on, the same as the other rail; consequently your rail breaks down on either side of the patch.

X Int. 51. Does the patch break through, or the part that has not been patched?

A. In some cases it will break through, but oftener it breaks out at the end of the patch.

X Int. 52. If you discard the jaws and have nothing but a bottom support to the rail, what will be the effect on that rail while patching it?

A. Well, it will compress that neck so that you cannot hardly use it. I think that is in fish-joint iron; in the common T-rail it would not make so much difference.

X Int. 53. Would it not perfectly destroy the fish-rail at the part patched, when in this soft state, while hammering the patch on the rail having only a bottom support?

A. I think it would.

Redirect examination:

776 Int. 1. In answer to the thirty-second cross-interrogatory, you say in patching a rail having a bottom, bearing the neck of the rail gets depressed; consequently you have to take your punch and open the holes, and split the neck of your rail in so doing; have you found a remedy for thus depressing the neck and closing the holes? If you say you have found a remedy, please state in what that remedy consists.

A. Yes; it consists in taking out the bottom bearing or support.

Int. 2. Having taken out this bottom bearing or support to the rail, are the necks of the rails depressed and the holes closed up, as before, in patching?

A. No, sir.

Int. 3. Are the rails now patched as free in the neck to receive the fish-plate as when they first came out of the track and carried to the shops to be repaired?

A. Yes, sir.

(Same objections as noted in the direct examination.)

Recross-examination:

X Int. 1. When and where did you first find this remedy for keeping the rails so nicely?

A. I think it was about four months since, at Bloomington; it may have been a little more.

X Int. 2. Did you find it or some one else tell you of it?

A. Mr. S. N. Whipple told me of it; he thought it would make an improvement and obviate the difficulty we had been *been* laboring under.

Redirect examination resumed:

Int. 1. Has it obviated the difficulty you were laboring under?

A. Yes, sir.

Int. 3. Do you know this from your own knowledge?

A. Yes, sir.

777 JAMES FLAVIN.

Int. 1. What is your name, age, residence, and occupation, and how long have you been so employed, and for whom?

A. My name is James Flavin; my age is about 35 years; I cannot exactly say; I reside in Bloomington; I repair T-rail now; I have been so employed for the Chicago, Alton and St. Louis Railroad Company going on five years.

Int. 2. Please look at the model marked "Fort Wayne Vise," and state whether or not it is substantially the same in construction and mode of operation as the one used by you for patching rails for the Chicago & Alton Company at Bloomington.

A. The working part of the block is about the same; as far as I can see they work about the same; the top part of the block there is some difference in the swedge part of it; it is essentially the same; the swedges are all on the one side, and there is none on the slide part.

Int. 3. What kind of T-rails have you repaired on that road?

A. There are several different kinds of iron used on the road. I have repaired the chair-iron rail and the fish-plate iron; the rails are of different heights.

Int. 4. Have you done this work on a block like the model marked "Fort Wayne Vise?"

A. Yes, sir; except that our block sets on a wooden block or frame instead of cast iron, as I suppose this model represents.

Int. 5. Have you repaired railroad-rails in block or vise which support the rail under the bottom, and also in one that gave no support to the bottom of the rail?

A. I have, sir.

Int. 6. Having worked on both blocks, what conclusion have you come to as to the amount and quality of work which you have done on the two blocks respectively?

A. Well, in regard to the lower block, that is, the common or chair-iron block, I would not care so much either way, having the bottom in
778 or out; still, with the bottom on, it will give the rail a chance to keep its own where it belongs. With regard to the high iron in the repairing on the ends of them, the block has a tendency, with a bottom bearing, for to diminish the height of the neck between caps and flange from its former height, more or less; the more the rail is worn out the worse it is on the neck with a bottom bearing.

Int. 7. Do you know, from your own knowledge, having observed and measured the same, that the shape of the neck of the fish-plate rail is completely preserved while in the jaws under the process of patching the rail having no bottom bearing?

A. Well, it has more of a chance to preserve itself without a bottom than with it. The reason why this is so, much space on the fish-plate rail forms cap to flange, the neck being so wide and so weak, and not having body to support it, that is, for the weight of the rail itself.

Int. 8. Do the bolt-holes for the fish-plate close at all when the rail is being patched in a vise which gives no bottom bearing to the rail?

A. Not to any account.

Int. 9. Can the same be said of a vise which gives a bottom bearing to the rail?

A. Yes, sir; when the rail has a bottom bearing to the fish-plate, the more labor there is on the rail with regard to repairing it the shorter space will be on the neck with the bottom bearing.

Int. 10. Did you intend to say, to answer, "Yes, sir," to the last interrogatory?

A. I mean to say, "Yes, sir," as to squeezing the neck together as to the bottom bearing.

Int. 11. That is to say, it closes the holes; is that what you mean?

A. Yes, sir; that is what I mean.

Int. 12. Is the bottom bearing of any advantage in cutting off the patch when the weld is made, or not?

A. None, sir; no use.

779 Int. 13. Are the jaws required to hold the rail in cutting it off when no patching is to be done? or, in other words, it is necessary to have the clamping-jaws for this purpose?

A. Well, a rail can be cut full as well with the jaws, and it can be cut without the jaws. With the jaws working, or this fish-plate irons in the block, it will keep a little more to its proper shape in the cutting of it, more so than it would out of the block.

Int. 14. How do you manage to cut off rails on the block, the rail having no bottom bearing?

A. I put the rail in the block, cut the cap through to the neck, throw the block open, put the rail on the top of the block, or in the block when it is open; by doing so you do not tear the neck of the rail apart; whereas, if you left it in the block without this bottom bearing, on account of being so much space from the flange of the rail to the block, it is bound to tear apart.

Int. 15. All things being favorable and equal and the same, except that one machine gives a bottom bearing to the rail and the other does not, on which machine or vise can you do the most or best work in a day or week, or any other length of time? Please answer this question according to your own knowledge and experience.

A. Without this bottom bearing with this fish-plate iron I can do this work to more satisfaction; at least it suits our superior better than the other did, on account of the rail being diminished in height.

Int. 16. You say diminished in height; how?

A. Well, with regard of having the bottom bearing from the flange of the rail, it gives the rail a chance to keep in its proper place. Where the flange has no bearing on the block the neck diminishes from its proper height, so that they can't get their straps on without cutting on the side of the rail, so as to make room for them to get on the neck.

780 (The complainant objects to each and every of the foregoing interrogatories, and to the several answers thereto, in regard to the use or opinion in the use of the machine with the bottom out, as incompetent and irrelevant to any matters in issue in each of the foregoing cases.)

Cross-examination:

X Int. 1. When did you first commence repairing rails in a machine where the bottom was taken out, and who ordered it out?

A. I think it was about 5 months since; Mr. Theodore White ordered it out.

X Int. 2. Who was with Mr. White at the shops at the time they talked about planing the bottom down, and what did they say was the object for so doing?

A. Mr. White told me to take the block up to the shop; that he had come to the conclusion that he would have from $\frac{1}{2}$ to $\frac{3}{8}$ of an inch taken out of the machine; I cannot say which. Mr. Whipple was in the shop at the time. I could not say what their conversation was at the time about it and the balance of the men that worked there. Mr. White told me that the object was for to keep the rail in its proper place, that is, to give the neck its former height; whereas with the bottom bearing the neck would be drawn up from its former height probably a quarter

to an eighth of an inch, according to the labor on the rail; therefore it would not give the straps a chance to get on, could not put them on, and when they make a connection with a rail that has been repaired and the one that has not been repaired, it brings the neck of the rail that has been repaired so much lower with the one that has not been repaired, therefore they cannot make a good joint or connection, whichever you may call it, for one would be so much higher than the others.

X Int. 3. Have you heard anything about the company being sued for the use of this block. If yea, when and where, and who did you hear saying anything about it?

781 A. No, sir; I have not. I heard they were going to be sued, though. That is about a year ago, or something like it. I think Mr. Turrill and Mr. Raglin were in the shop, and I heard them saying something about it. I never heard any one else saying anything about it.

X Int. 4. When did you first know that you were coming to Chicago to give your deposition, or did you expect to do so at the time they made the change in this machine?

A. I did not know anything about it until the forenoon of the day we came up here. I had no idea what their object was for making that change, unless for the benefit of keeping the rail in its proper shape.

X Int. 5. Did any one tell you to keep an account or notice the result, or measure the rails after the machine was planed down, as you have testified to.

A. They did not tell me to keep no account of the number of rails I have done from the time the block got planed out; not any more since than I had done before. The foreman there keeps the account that I give him of the number of rails I do, therefore I don't have anything more to do with them.

X Int. Then your attention was not called to noticing the work since the bottom was out?

A. With regard to the work since the bottom was out, I can repair, or have done, the fish-plate with less labor than any of them that I had done previous to that; my attention was called to it as to keeping the rail in its proper place.

X Int. 7. By whom, and what did he say in regard to it?

A. Mr. White asked me to know if I thought if the block with the bottom out would not have a better job, as to repairing iron with the bottom out than with it in. I told him it would.

X Int. 8. How did you know that, having never tried it?

A. I did, sir, having worked it.

782 X Int. 9. What kind of rails did you repair on this block, and how high were they after you had cut the bottom down, as stated?

A. On what we called the old common block we repaired the chair-rail; they run 3, 3½, 3¾, and 3⅝. I cannot say exactly on the fish-plate block; 4, 4⅜ in fish plate rails.

X Int. 10. Did the rails when placed in the block come up higher than the jaws before it was cut out?

A. The cap of the rail did.

X Int. 11. How high did the jaws come up to the side of the rail before it was planed out?

A. As a general thing the rails vary more or less from the block; some of them would come tight on the rail, and some of them would not; some fall an eighth of an inch short, some fit close.

X Int. 12. Do you consider yourself No. 1 or ordinary rail-patcher, and how many inches did you ever patch in one day, and how many inches did you ever put on in one weld?

A. No. 1; sometimes as high as 280 and 295 inches; this was not very often. I have put on from 16 to 17 inches.

X Int. 13. If you discard the jaws, what would be the effect in repairing the rail with only a bottom support?

A. I think you would make a mighty poor job of it, sir, especially on the fish-plate iron.

X Int. 14. Is not the fish-plate much higher in the neck than the old T-rail, and very thin as compared with the other, and more difficult to repair on account of the iron being so poor and more brittle?

A. Yes, sir, it is; and harder to be repaired on account of its being so weak in the neck.

X Int. 15. Do the necks ever split while being repaired?

A. Well, they did split, a good deal of them, when we had the bottom bearing.

X Int. 16. How is that; what caused them to split then?

783 A. They did not have support enough to keep the labor off the neck with the bottom bearing.

X Int. 18. Do they have more support with the bottom out than they did before?

A. They have more support; it throws no labor on the neck of the rail when the bottom is out; it rests on the shoulder or cap of the rail.

X Int. 19. Why do they have more support; are not the jaws just the same in both instances?

A. I suppose the jaws is the same, but by having the bottom out there is no bearing on the flange of the rail.

JAMES FLAVIN.

JAMES BOX.

Int. 1. What is your name, age, residence, and occupation, and how long have you been so employed, and by whom?

A. My name is James Box; my age is 42; I reside in Bloomington, State of Illinois; I am a blacksmith; I have worked at it for 29 years; I have never done anything else; I have worked for different companies, for the Rock Island Road, Grand Trunk, for Stone & Boomer, on car-works, and for myself nine years at Lockport, the Alton & St. Louis Road at Joliet about four months, then went to Bloomington about five months; have worked on the St. Louis, Chicago & Alton as foreman in the T-rail and repair shops and am still engaged for them.

Int. 2. Look at the model marked "Fort Wayne vise," and state what it represents.

A. It represents a vise or block to repair T-rails.

Int. 3. Do you use anything like it to repair T-rails in your shop at Bloomington? if so, state in what respect it is like it and how it differs, if at all.

784 A. The jaws appear to be the same and the mode of operating seems to be the same; the difference is that instead of being on legs as seen in the model, it acts on blocks of wood; instead of one groove on the top on the right-hand side, ours has three grooves, and instead of having one groove on the movable jaw we have none otherwise; I do not see any difference in the operation; the principle is the same.

Int. 4. Have you repaired rails in a block or vise that gave support to the bottom of the rail and also on one that gave no support to the bottom? If so, please state the results of the operations in both cases.

A. I have. In the first block, with the bottom support, I found a difficulty in the rails going down on the neck, causing the extra labor of

using a fuller to raise them with; then these that I have used with no bottom support obviates that error and keeps the rail in better shape.

Int. 5. Why does the rail go down on the neck?

A. Because our rails are not all one height, and the other reason is, the rail being hot, and by working down to its proper place while hot, then being taken out of the block it contracts.

Int. 6. Has the bottom support anything to do with going down on the neck, as you say, or not?

A. Yes, it has. The bottom support keeping the flange of the rail so tight against the jaw that there is no chance, but that it will go down while it is hot.

Int. 7. How can this going down on the neck, as you say, be obviated when the neck of the rail extends above the top of the jaws, the bottom of the rail being supported underneath?

A. It can be obviated by ploughing out the bottom of the block.

Int. 8. In putting on a patch while the rail is clamped in the jaw, the rail having no support under the bottom, how will the neck be effected; will it be lengthened or shortened?

785 A. Neither, to any extent, as there are two forces connecting a pressing force and an upsetting force; the jaws of the vise cause the pressing force, then striking iron suspended causes the upsetting force.

Int. 9. Do you know from your own knowledge and experience, that is to say, by actual measurement, that there is no essential change takes place in the neck of the rail consequent to welding on the patch in a vise that clamps the rail against the neck and under the crown, the rail having no bottom support?

A. I do, as far as a square can measure it, that there is no perceptible difference. This is my experience; I have tried this.

Int. 10. And therefore you know, do you, that a rail patched under the circumstances set forth in the foregoing interrogatory that it will come out of the jaws as it went in, unchanged in the relations between crown and flange?

A. If the block being true and fit the rail underneath the crown, it will.

Int. 11. Which can you do the most work in, a block or vise without bottom support to the rail, or with one that gives the rail such support?

A. My experience is that I can do more with the block without the bottom support; a rail worked or patched in a block with bottom support has most times to be raised with a fuller, whilst a block without the bottom support does not need that labor.

Int. 12. How long has there been a block vise at the shop at Bloomington, the bottom support to the rail planed out?

A. Since about the 18th of September, 1869.

Int. 13. Who has worked on that block from that time to the present?

A. The time that block has been in use, during since it was done, James Flavin has worked mostly on it.

Int. 14. Have you kept an account of the number of rails patched

786 by him in a block or vise planed out, and also in a block with a bottom support to the rail? if so, state the account so kept, and when kept.

A. I do keep a regular account of all rails repaired in the shop all the time. If you wish to hear the number of rails given in the month of September, 1869, two weeks before the block was ploughed out, and about two weeks after by the same fire and the same use, I will give it.

Int. 15. Please give it.

A. Nine days previous to the ploughing out of the block there was repaired 140 rails; nine days after the ploughing of the block there was 155 rails.

Int. 16. Was the work in both cases done under the same circumstances, except that the bottom of the machine was ploughed out?

A. No; the 9 days after the block was ploughed out there was forty-two pounds more of iron than the 9 days previous, otherwise the same.

Int. 17. Were you to patch rails by the job or piece, which of the two blocks in question would you choose, taking quality and quantity into account? Whatever your answer may be, give your reasons for it.

A. I should choose the one with the bottom support out, for two reasons: first, the necessity for not using a fuller in patching, and not closing up the holes; and, second, in cutting off without the under support, take it out of the vise and keeps it better to finish up and punch as you have to take it out and put it on the block to cut it.

Int. 18. Then you do not use the jaws by cutting rails where no patching is to be done, do you?

A. We do use the jaws in cutting through the crown of the rail, as it leaves the neck, or under part of the crown, in better shape to receive the fish-plates.

Int. 19. Do you allude in this answer to cutting off the rail after the patch is put on, or two rails that are cut in two and no patching is done?

787 A. I allude to the patching of rails when there is no patching done.

Int. 20. You speak of cutting through the crown; do you also cut through the neck and flange, the bottom of the rail having no support?

A. No; after cutting the crown, we take the rail out of the vise and place it on the block on the top, and cut it off.

Int. 21. What depth of metal is ploughed out of the block under the jaws of the vise?

A. The order was given to have one-half inch ploughed out. I did not measure it since.

(The complainant objects to each and every of the foregoing interrogatories, and to the several answers thereto, in regard to the use, or opinion in the use, of the machine with the bottom out, as incompetent and irrelevant to any matters in issue in each of the foregoing cases.)

Cross-examination:

X Int. 1. Who gave the order to have the bottom ploughed out, as you have stated?

A. Mr. White gave the order to have them carried up to the machine-shop, and Mr. James Flavin went up to the machine-shop with them.

X Int. 2. What is Mr. White's business in connection with the Chicago, Alton & St. Louis Railroad?

A. He is road-master of the third division.

X Int. 3. Did he give you this order in person?

A. Yes, sir.

X Int. 4. Did he state to you any object for having this done—having the bottom planed out?

A. No, sir; he did not.

X Int. 5. Did Mr. White say at whose request it had been ordered to be done?

A. He did not.

788 X Int. 6. Why were you so very particular in keeping the ac-

count of rails repaired by each method, for the time stated in your direct examination?

A. I was not particular in keeping the number of rails that special time, as it is my duty to keep the exact number of rails repaired in that shop, and make a faithful return of the same every month.

X Int. 7. Who ordered you to bring this account which you have taken these amounts from as you have stated?

A. No one.

X Int. 8. Why were you so particularly interested to get the amounts from nine days each way from the 19th of September, no one having said anything to you about it, as you have answered before?

A. S. M. Whipple, counsel, asked me to give it.

X Int. 9. Why, and for what reasons did he want you to give it, and when did you first become acquainted with Mr. S. W. Whipple, and how often have you seen him and had conversations with him about giving your testimony? If yea, upon what subjects?

A. He wanted to know on which block a man could do the most work, on one with the bottom ploughed out or one with the bottom supported, from a man that did not know or feel interested in the b'ocks. The first time I ever spoke to Mr. Whipple was one day last week. I have seen him twice in Bloomington and since I came here to the commissioner's office yesterday and to-day. Mr. Whipple, in Bloomingtan, one day last week, Wednesday or Thursday, said he would want to have my testimony in regard to them blocks which have been ploughed out. We had conversation about it twice.

X Int. 10. Where and when did you first see Mr. Whipple?

A. In Bloomington at the T-rail*road* shop, somewhere about the 19th or 30th of September; the 19th I think it was.

789 X. Int. 11. Did you have any conversation with him at that time, and what appeared to be his business there?

A. I did not. He was looking at the blocks.

X Int. 12. Who was with him at that time?

A. Mr. White.

X Int. 13. Do you keep any account of the amount of patching done upon the rails, or only the number of rails?

A. We keep the number of rails repaired and the pounds of iron used for patching the same; we also set them down as we carry them out of the shop. We keep the number of 'nches put upon each rail.

X Int. 14. To whom do you render such account, and how often?

A. To Mr. White, once a month.

X Int. 15. About how much coal or coke do you use at each rail-fire per day?

A. About 235 pounds.

X Int. 16. How many hands are employed, and the wages of each, to each fire?

A. Four hands to the T-rail fire; the helpers each get $1.90 per day, the foreman, $3.20.

X Int. 17. What wages do you get as foreman of the shop?

A. Eighty-five dollars per month, or about $3.37 per day.

X Int. 18. Do you do as much or more work than other roads in repairing rails?

A. We do as much.

X Int. 19. Have you ever repaired railroad-rails yourself; if yea, when, where, and how long, and with what kind of a machine?

A. I have repaired railroad-rails this fall occasionally about two months, using a block with bottom support the most of the time, and

a block ploughed out fitting fish-plate rail, and also chair-rail; I do not patch rails regularly.

790 X Int. 20. Did you repair the chair-rail with the same machine that you did the fish-joint rail; if not, why not?

A. I did not, because the shape of the jaws will not admit of the two rails to be patched in the same machine.

X Int. 21. If you discard the jaws and have only a bottom support, what would be the effect upon the rail in repairing in it either the fish-joint or the chair-rail?

A. I do not see that it could be done in a workmanlike manner, so as to pay for repairing.

X Int. 22. How many places on the Chicago & Alton Railroad have you heard of know where railroad-rails are repaired, and how many fires do you know being used for repairing rails?

A. I have heard (but I do not know) that there are four shops for repairing rails; I only know of one place, as I never was in the others; we have two rail-fires at Bloomington.

X Int. 23. In your direct examination you speak in cutting off a rail that you cut through the crown or head while it is in the jaws, then take it out and place it on the anvil and finish the cutting off; why do you do this?

A. Because cutting off the rail in the jaws below the crown, you commence to drive down the flange, and by putting it on the top of the block you avoid any danger and cut it smoother than you can at the bottom of the block without a bottom support.

X Int. 24. How would it be in not having any bottom support in cutting down through the rail, and do you not cut the rail close to the jaws of the machine?

A. We cannot do it without resting the bottom of the flange on some block; there is not any real necessity to put the rail in the jaws to cut the rail off; when we put the rail in the jaws of the vise we do not cut it off close to the jaws.

X Int. 25. Is not the neck of a fish-plate rail quite thin and rather poor iron in the rail, and will it not upset in cutting it off, if you do not have something to support it under the head?

791 A. It is. It will upset some, but with sharp chisels it can be avoided, more or less.

X Int. 26. As you drive the chisel down through the rail, cutting it off, is it not liable to keep upsetting, as the chisel is getting thicker all the while as you are going down through the rail?

A. It will not upset far enough from the end, but you can cut it off from under the crowns sufficient to let the fish-plate have its full bearing.

JAMES BOX.

O. A. SIMONS.

Int. 1. What is your name, age, residence, and occupation, and how long have you been so employed, and for whom?

A. O. A. Simons; age, thirty-six; residence, Fort Wayne, Indiana; occupation, road-master Western Division Pittsburgh, Fort Wayne and Chicago Railroad; have been so employed since January 1st, 1866. I have been track-man since 1856.

Int. 2. Does the Pittsburgh and Fort Wayne Railroad Company patch rails; if yea, where and how long?

A. They do. At Upper Sandusky and at Lima, Ohio. They have

patched at Fort Wayne, Columbus, and Plymouth, Indiana; at Lima and Upper Sandusky since 1863 or 1864, and at Fort Wayne, Columbus, and Plymouth since some time later, and discontinued very soon.

Int. 3. Look at model marked "Fort Wayne vise," and state what it represents.

A. It represents a vise used in shops named before, and is now used at Lima and Sandusky.

Int. 4. What alteration, if any, has been made in the vise since you commenced patching rails in it?

792 A. There was half an inch planed out from the rail-seat, or the part underneath the rail when closed in the vise.

Int. 5. For what purpose was that half inch planed out, and by whose directions?

A. For the purpose of suspending the rail by the neck and head alone, and not from the bottom. The alteration was made in the shop by my directions and upon an order from the superintendent of the division.

Int. 6. What experiment, if any, did you try in this matter of planing out the rail seat upon which the bottom of the rail rested when in the jaws to be patched?

A. I first cut out a quarter of an inch of one machine, and then I cut out a half an inch out of another machine, and sent one to Lima and one to Sandusky.

Int. 7. What was the result of the experiment—successful or unsuccessful?

A. The result was good.

Int. 8. Have you taken notice of the rails repaired in the vise both at Lima and Sandusky since they were put in the track; and, if so, is the work done as well as when the rail was repaired in the vise that gave bottom support to the rail?

A. I have. The work looked as well, and has given good satisfaction. None of these rails have given us trouble of any kind.

Int. 9. Has your attention ever been called, at any time, and by any of your workmen, to the upsetting or thickening of the rail when being patched in the vise which gives support to the bottom of the rail; and, if yea, when and by whom?

A. It has, by Isaac Hooper, fireman of the shop at Lima, several times since he first went to that shop, I think in the year 1865.

Int. 10. Did he or not state to you how he thought a block or vise might be altered so as to prevent this upsetting the neck in the welding on the patch?

793 A. He did. His statements were not very carefully attended to by me. I always considered mechanics a bore, and did not pay much attention to it.

Int. 11. Did Mr. Hooper state what alteration he would like to have made; and, if so, what?

A. He stated; but, for the reason I stated before, my memory is not clear. I recollect his requirements would involve the sending the machine to Fort Wayne, in order to have planing done on it, which I did not feel like doing. I did not give as careful attention to the alteration he proposed to make as I perhaps ought to have done, and likely would have done had there been an iron-planer at Lima.

(The complainant objects to each and every of the foregoing interrogatories, and to the several answers thereto, in regard to the use, or opinion in the use, of the machine with the bottom out, as incompetent and irrelevant to any matters in issue in each of the foregoing causes.)

Cross-examination:

X Int. 1. What are your duties as required by the Pittsburgh, Ft. Wayne and Chicago Railroad Company?

A. I am required to look after repairs of track and supplies of wood and water, etc.

X Int. 2. Are you a blacksmith by trade; and, if yea, did you ever repair any railroad-rails?

A. I am not.

X Int. 3. How many rails have you seen repaired in the machine with the bottom planed out?

A. Not many. I have seen them working with the machine spoken of with the men about it, but have never spent much time with the machine.

X Int. 4. Do you know, of your own knowledge, that the rails you have spoken of being laid in the track were repaired on the machine after you had planed out the bottom of it?

A. I do.

X Int. 5. Did you see them repaired and taken out and laid in the track?

794 A. I know the rails were taken to the shops and saw the men working at them at different times repairing them; that they were taken from there out on the road and laid in the track; that they could not have been repaired on any other machines than those, as there were no other machines in use at the time in those shops, except those with the alteration made in them.

X Int. 6. When was the alteration made which you speak of in the machine?

A. Some time early in the fall or late in the summer of 1869.

X Int. 7. Did you ever hear or learn that there was any controversy in regard to using this machine as to its having been patented, and railroad companies been sued for the use of it; if so, when did you first learn of it?

A. I have heard that some man claimed to have a patent for it; I do not know who he was, or when or where I first heard of it. Did not know until very recently that the Pittsburgh, Ft. Wayne and Chicago Railroad Company had been sued.

X Int. 8. What is the kind and length of rail used on the Pittsburgh, Ft. Wayne and Chicago Railroad, and how many different kinds are there?

A. T; the length varies from twenty to twenty-seven and a half feet. There are rails used with a chair-joint and with a fish-bar, or what is commonly called splice-joint. The iron used with a common chair-joint is about three and five-eighths inches high, and that used with the splice-joints about four inches high; of the latter we have from several different rolling-mills, differing slightly as to pattern and height, but not materially; also differs as to distance of the holes from the end of the rail and from each other.

X Int. 9. What proportion of your division of the road is laid with this fish-joint rail, and for how long a time has it been used in the track?

795 A. We commenced getting the fish-bar iron about the year 1863; have bought of that kind alone since that time; about five-sixths or six*th* sevenths of the main is now laid with that kind of iron.

X Int. 10. Please describe the fish-plates that you use in connecting the ends of the rail in laying the track.

A. It is a bar about five-eighths of an inch thick and two inches and

a half wide, twenty-one or two inches long, formed so as to fit in the hollow of the rail, with four holes through it, through which two bolts pass, for each rail forming the joint.

X Int. 11. How much of a hollow is there in the fish-joint rail, and is not the neck perpendicular on each side of it when it lies in its natural position, as in the track, except a slight curve of the flange and underside of the crown of the rail?

A. There is hollow enough to admit of the above-described splice; it is perpendicular on the sides, just at the top and bottom of the web.

X Int. 12. What are the configurations of what is termed a T-rail for chair joint in the neck; is it perpendicular, or in the arc of a circle?

A. It is curved in part of a circle.

X Int. 13. What is the thickness of the neck of fish-joint rail, as used on your road?

A. It is about three fourths of an inch; may be a little less.

O. A. SIMONS.

SAMUEL LAWLOR.

Int. 1. What is your name, age, residence, and occupation?

A. My name is Samuel Lawler; my age is about 40. I am a blacksmith, in the employ of Pittsburgh, Ft. Wayne Railroad at Lima. I reside at Lima.

796 Int. 2. Have you served as an apprentice at blacksmithing?

A. No, sir; I never served my time out.

Int. 3. Have you ever done any other kinds of work besides rail-repairing; if so, what?

A. Yes, sir; I have made tools, and various other work required on railroads.

Int. 4. Have you repaired railroad-rails; if so, how long and where?

A. Yes, sir; 12 years at Cardington, for the Cleveland, Columbus & Cincinnati Railroad, and at Lima for the Pittsburgh & Fort Wayne Railway Company.

Int. 5. What kind of rails did you repair at those places?

A. Both kinds, sir; the common T-rail and the fish-joint rail.

Int. 6. What kind of a machine did you use in repairing rails in both those places?

A. We used different kinds at both places; we used a machine with jaws like the model marked "Ft. Wayne Vise;" one was for chair-iron and the other for fish-joint rail.

Int. 7. Did the machine or vise used at Cardington have a support for the bottom of the rail?

A. Yes, sir.

Int. 8. What difficulties, if any, did you encounter by having the bottom support?

A. I found that it upset the necks so that the fish-plate would not go in them; we had to heat it again and raise it up with a fuller and sometimes to chip it out.

Int. 9. Did you encounter the same difficulty when you went to Lima to repair rails?

A. Yes, sir; when I repaired the fish-rail.

Int. 10. How long did you work at Lima repairing rails with a machine that had a support for the bottom of the rail?

A. Over five years.

797 Int. 11. Did it ever occur to you what alteration, if any, might be made to the machine so that the neck of the rail would not be upset in welding on the patch?

A. No, sir.

Int. 12. Has there been any alteration made to avoid this upsetting or thickening of the neck?

A. Yes, sir; by loosing the bottom support.

Int. 13. What do you mean by loosing the bottom support?

A. I mean take it out.

Int. 14. Is the model before you marked "Ft. Wayne Vise," with the rail marked "Ft. Wayne Rail" in the jaws, a correct representation of the vise used at the Lima shops?

A. Yes, sir.

Int. 15. How many rails, on an average, do you repair on this vise?

A. I do not know how they average; sometimes 12, sometimes 16, sometimes 10.

Int. 16. What you average per day?

A. I should think about 13.

Int. 17. Do you get out as many rails in the vise since the bottom was taken out as when it was in?

A. Some days more, and more days less, according to the work.

Int. 18. All things taken into account, can you do as much work and as good work in a vise without a bottom support to the under-side of the rail?

A. Yes, sir.

Int. 19. Were you at work by the piece or job, which vise would you prefer, one that gave a support to the bottom of the rail or one that gave no support?

A. I would choose the one that gave no support.

Int. 20. Why? Please give your reasons.

A. I would not have so much work to do on them. I would not have to raise the sides of the rail nor to punch out the holes.

798 Int. 21. Why would you have to raise the sides of the rail?

A. So that the fish-plate would fit to bolted on again.

Int. 22. Am I to understand that when a rail is mended in a vise which gives a bottom support to the rail, that the neck upsets or shortens or thickens, and you have to fuller it out to make the fish-plate fit?

A. I do not know how to answer that. It has to be done to make the plate fit.

Int. 23. That is, it thickens or upsets the neck, does it?

A. Yes, sir.

Int. 24. In cutting off the patch, when it is welded on the rail, do you find any difficulty for want of this bottom support?

A. No, sir; the slats keep the rail up.

Int. 25. Do you mean by the slats that the jaws support the head of the rail?

A. Yes, sir; or the jaws of the vise which hold the rail.

Int. 26. In cutting off the rails that need no patching, did you use the jaws for holding the rail when at work at Cardington and afterwards at Lima?

A. Yes, sir.

Int. 27. Do you prefer jaws for that purpose or will the top of the anvil answer that purpose, or any other plain block?

A. Any other plain block will do to cut them.

(The complainant objects to each and every of the foregoing interrogatories and to the several answers thereto in regard to the use, or opinion in the use, of the machine with the bottom out, as incompetent and irrelevent to any matters in issue in each of the foregoing cases.)

Cross-interrogatories:

X Int. 1. When did you first commence to repair rails with the bottom planed out of the machine, as you have testified to?

A. Over two months ago.

799 X Int. 2. How long have you repaired rails at the Lima shops for the Pittsburgh, Ft. Wayne, and Chicago Railroad?

A. Over five years.

X Int. 3. What kind of rails?

A. Chair-iron rails or T-rails.

X Int. 4. When did you first commence repairing the fish-joint rails?

A. I do not think I know the time.

X Int. 5. How many fires have they had in that shop, and how many at the present time, used for repairing rails?

A. There was four at one time; two at the present time.

X Int. 6. How long a patch in inches have you put on a rail at one welding-heat in the machine?

A. I suppose it would average a foot.

X Int. 7. Have you ever repaired the old-fashoned T or chair rail on a common anvil or wedge' block?

A. I have helped at the fire where they were repaired.

X Int. 8. If you discard the blocks or jaws shown in the model marked "Fort Wayne vise," what would be the effect in repairing the fish-joint rail with nothing but a bottom support?

A. My impression is I could not do it.

X Int. 9. Why not?

A. It would smash down the neck of the rail by having no support at the side or under the bulb.

X Int. 10. Could you not fuller it back up to its proper height after the patch had been welded on?

A. I think not.

X Int. 11. Please describe the machine you have used in repairing rails, in your own way, as to size, weight, length of the jaws, heft of the same, as near you can.

A. I could not do it.

X Int. 12. In your opinion how heavy is it—the machine used in repairing rails?

800 A. I do not know how heavy it is. I have never weighed it or seen it weighed.

X Int. 13. About how long are the jaws of the machine used in repairing rails?

A. I do not know. I never weighed them.

X Int. 14. Are they one foot long?

A. Yes, sir; they are one foot long.

X Int. 15. Are they two feet long?

A. That I don't know.

X Int. 16. How long have you worked on this machine in repairing rails?

A. I do not know how long I have worked on it. They have changed the blocks. I have worked on both kinds.

X Int. 17. Supposing you had a machine made to fit the rail as represented by the model marked "X," the jaws coming up to the center of the head, would it upset that rail to repair it in such a machine?

A. I do not know anything about that. I have not experienced it. It is used to rest on the bottom more than on the top.

X Int. 18. Did you ever repair any railroad rails adapted to fit in the machine with the jaws coming up to the center of the crown of the head,

with the bottom of the rail resting on the seat or the anvil of the machine?

A. I have mended chair-iron that fitted.

X Int. 19. Did you ever mend any fish-plate rails in the manner referred to in the last interrogatory?

A. None that would fit so tight as has been represented.

X Int. 20. About how much coal or coke do you use per day at your fire repairing rails?

A. I do not know. I never weighed it or measured it.

X. Int. 21. Do you know how much wages you are getting per day, and are you foreman of a rail fire?

A. I know how much wages I get. I am no foreman in charge at all; there is a foreman over me.

801 X Int. 22. Are you what they call and term a helper at a rail-fire?

A. I am not a helper, but what is called the blacksmith.

X Int. 23. Do you have charge of the fire for making rails?

A. All the charge I have is to do as I am told—work the same as any other man in the shop.

X Int. 24. What wages do you get per day, and what have you been getting during the time you have been at work there per day?

A. Two dollars and twenty-five cents.

X Int. 25. When did you first learn that you would be wanted as a witness to testify regarding this block for repairing railroad-rails?

A. Some time last Saturday, the foreman told me.

X Int. 26. Did you ever hear of there being a patent on the block in controversy; and, if so, when and where?

A. I do not know exactly how long ago; I have heard some talk about the matter; I do not know where.

X Int. 27. Did you hear anything about it the time this machine was sent away to be planed out, or shortly after?

A. I had heard there was a patent on this block before that; I do not know how long before.

X Int. 28. Have you been sworn to tell the truth, and the whole truth, relating to this matter; if yea, have you done so to the best of your knowledge and belief, or have you been testifying for the benefit of railroad companies, regardless of the facts in the case?

A. Yes, sir; I have, regardless of anybody or anything, and with a clear conscience.

X Int. 29. Do you keep any account of the rails repaired by you, or the amount of patching put upon them?

A. I tell the foreman in the morning how many I have put out the day before; do not tell the amount of patching.

802 X Int. 30. Who is the foreman of your shop?

A. Isaac Hooper.

SAMUEL LAWLOR.

HENRY COOPER.

Int. 1. What is your name, age, residence, and occupation?

A. My name is Henry Cooper; my age, 38 years. I reside at Upper Sandusky, Ohio; I am a blacksmith, and have charge of the blacksmith-shop for the Pittsburgh and Fort Wayne Road at Upper Sandusky.

Int. 2. Does this company mend rails at Upper Sandusky, at the shop of which you say you are foreman?

A. Yes, sir; they do.

Int. 3. Look at model marked "Fort Wayne vise," and state what it represents.

A. I think it is a correct model of our block at Upper Sandusky, which we use for patching rails.

Int. 4. Does or not the rail, when in the vise or block for patching, have any under support?

A. No, sir; they have no bottom support.

Int. 5. Is or not the rail marked "Fort Wayne rail," as seen in the vise, suspended, as seen in the model?

A. It is suspended at the top.

Int. 6. What space, if any, is left between the rail and the block?

A. I should think about half an inch.

Int. 7. What advantage, if any, does this space or vacant place give in repairing or patching rails?

803 A. We can patch more rails and do it with less labor, for the reason that before this bottom support was planed out we upset the neck of the rail from a quarter to three-eighths and sometimes up to half an inch, although I never measured it to know exactly, so that we were obliged to raise it with a fuller and chip out with a chisel in order to get the splice to fit. It also closed the holes in the rails through which the bolts passed *through* to hold the splice to connect the rails, and we have to open them again with a punch, and very often this would split open or crack the neck. Without this bottom support we can patch our rails without upsetting the neck or closing the holes.

Int. 8. In cutting off rails where no patching is required, what do you use?

A. We use the top of the block, as seen in the model.

Int. 9. What number of rails do you get out per day at your shop with one fire?

A. We average from fourteen to fifteen rails.

Int. 10. In your opinion, is the use of a support for the under side of a rail of advantage or disadvantage, all things taken into account?

A. It is an advantage without it.

Int. 11. Will you please give your reasons for such an opinion?

A. As I stated before, without it, this bottom support, we do not upset the neck of the rail, and we turn out more rails per day.

Int. 12. How many more?

A. I think we turn out from two to three rails more, I am certain, than with a bottom support.

(The complainant objects to each and every of the foregoing interrogatories, and to the several answers thereto, in regard to the use, or opinions in the use, of the machine with the bottom out, as incompetent and irrelevant to any matters in issue in each of the foregoing cases.)

Cross-interrogatories:

804 X Int. 1. What led you to, and when and where did you first commence these experiments, spoken of in your direct examination, with the bottom out of the machine, as you have stated?

A. I hardly know how to answer that question, as some men higher in office than me had ordered this block away to be planed out. We commenced them at Upper Sandusky, Ohio. If I mistake not, it was about two months ago, perhaps longer.

X Int. 2. By whom was this machine ordered to be planed, and for what purpose and object was it so done, if you know?

A. I do not know. I was ordered to load the block on the cars. This is all I know about it. Mr. E. S. Peterson gave the orders to me.

X Int. 3. What position does E. S. Peterson occupy on the road?

A. He is supervisor.

X Int. 4. Did he state to you or any one else, to your knowledge, what his object was?

A. There had been something said, but I cannot bear in mind what it was.

X Int. 5. Where did you send this block to have it planed out?

A. Fort Wayne, Indiana; so I understand.

X Int. 6. Were or are you aware that the company who employs you have been sued for using a patent machine for repairing their railroad-rails?

A. I have understood so lately.

X Int. 7. What is the name of the machine you have used to repair railroad-rails?

A. I never heard the name to my knowledge.

X Int. 8. What do you call it in speaking of it?

A. We call it the rail-block.

X Int. 9. Did you ever hear it called the Whitcomb or Cleveland block?

805 A. No, sir; I never did that I remember of.

X Int. 10. Do you repair railroad-rails yourself; if so, how long?

A. I do not.

X Int. 11. Do you keep the account of rails repaired at your shop and the amount repaired on them, and if yea, who do you render your account to, and how is it kept and how often do you render such an account?

A. I do not keep an accurate account of the rail which we repair, nor the amount of repairs put upon each rail. I hand in my monthly report to E. S. Peterson every month. I put the number of men that work on rails and the number of men that are at work on other work, concerning blacksmithing and the amount of their wages. I have not been particular in keeping an accurate account of the number of rails repaired.

X Int. 12. How many fires do you use at Upper Sandusky, or how many do you know of being used on the road for repairing railroad-rails?

A. We use one rail-fire at Upper Sandusky. I only know of three on this road.

X Int. 13. How long have you had charge of the shop at Upper Sandusky, or in any other capacity for the company in the shop?

A. Two years next June.

X Int. 14. Do you have more than one machine in the shop used for repairing rails and in making frogs?

A. There is but one in the shop; we do not make frogs on it, either.

X Int. 15. Do you use a machine for making frogs, or for putting steel upon the rails in making frogs in any of the shops of the Pittsburgh and Fort Wayne Railroad to your knowledge?

A. I never knew one of those machines used for frog purposes, neither did I hear of steel being put upon the rail.

806 X Int. 16. What wages do you pay the foreman of the rail-fire, and what the helpers each per day, and what is the amount of coal used per day?

A. The foreman of the rail-fire is $2.25 per day; two helpers at $1.60 each per day. I never kept any account of the amount of coal used.

X Int. 17. What is the length, height, and weight per yard, and configuration of the rails as repaired at the shop in Upper Sandusky?

A. There are different lengths; the height I do not know; the weight I do not know. I cannot answer any of it with certainty.

X Int. 18. Please state the size and weight of the machine, and length of jaws used in repairing rails at Upper Sandusky.

A. I do not know the size nor weight of the machine. I never measured the length of the jaws.

X Int. 19. Do you have different height of railroad-rails to repair at Upper Sandusky?

A. Yes, sir; there is a difference in the height of some of the rails; I will not be positive whether the difference is in the height of the rail, or in ball of the rail, as I never measured them.

X Int. 20. Please describe a fish-plate particularly, as used to connect the joints of a fish-rail when laid on the track, as to length, height, and thickness.

A. Fish-plate—that is what we call a splice. I suppose they vary in length; I do not know what the length is; I never measured them, so I cannot state what their height or thickness is.

X Int. 21. If you were to weld two pieces of iron together, as a practical blacksmith, would you weld it together in the jaws of a vise or on the anvil?

A. I would weld it on the anvil.

X Int. 22. Why?

A. Because it is the proper place to weld it.

807 Redirect examination:

Int. 1. Is the matter of patching rails at Upper Sandusky in a machine or vise which gives no bottom support to the rails, an experiment?

A. Yes, sir; I think it does. I now understand the question; I do not know whether it is an experiment or not.

Int. 2. What is the result of the operation or experiment; is it successful or unsuccessful?

A. It has been successful without the bottom support.

(Signed) HENRY COOPER.

FRANK FITZGIBBON.

Int. 1. What is your name, age, and occupation, and how long have you been so employed, and for whom and where?

A. My name is Frank Fitzgibbon; my age, 34 years. I reside at Upper Sandusky, Ohio. I am a blacksmith. I have been so employed for the Pittsburgh, Ft. Wayne and Chicago Railway Company, at Upper Sandusky, Ohio, for eight years.

Int. 2. Have you done general blacksmithing during the time?

A. Yes, sir.

Int. 3. What particular work have you been engaged at for said company?

A. The principal part of my work has been cutting and patching rails.

Int. 4. What kind of a block or vise, if any, have you used for this purpose?

A. We have used two different kinds: one was for the old chair or T-rail, and the other was for the splice-bar rail sometimes called fish-joint rail.

Int. 5. Please describe the machine used by you for patching and cutting rails.

808 A. The model now before me, marked "Ft. Wayne Vise," will give a better description of it than I can describe it, for this seems to be just like the machine we use, and shows the manner of hold in the rail which we call the fish joint rail now in the jaws of the vise.

Int. 6. Are all the fish-joint rails of the same height?

A. No, sir.

Int. 7. Please state the difference, if any.

A. Some are higher than others. I never measured them so that I can tell the difference in the height of them. I should think there was difference in the height of them. I should think there was three different heights of them, perhaps four.

Int. 8. What is the difference, if any, between the machine marked "Fort Wayne Vise," and the one used by you two or three years ago?

A. The difference is that the machine used two or three years ago there was a bottom support to the rail, and now there is no support.

Int. 9. Please state the advantages or disadvantages, if any, in supporting the bottom of the rail while putting on the patch.

A. The disadvantage was that it upset the neck of the rail and almost closed the holes for the plate, on the ends of the rail.

Int. 10. What effect did this upsetting of the neck and closing of the holes have upon the fish-plate or splice-plate?

A. It put it out of shape so that the splice would not fit, and we had to chip it out and raise it with a fuller to make it fit.

Int. 11. Did you or not have to take another heat for this purpose?

A. Yes, sir; we did.

Int. 12. What advantages, if any, did you discover in using a vise that gives no support to the bottom of the rail?

A. I found an advantage in using a vise that gave no support
809 to the rail, inasmuch that it does not upset the rail as it did before the bottom support was taken out, and did not close the holes.

Int. 13. You mean, do you, no support to the bottom of the rail?

A. Yes, sir.

Int. 14. What, if any, difference in the amount of work done in a day of ten hours, in using a vise that gives a bottom support to the rail, and one that does not, as seen in the model marked "Fort Wayne Vise?"

A. The difference, as near as I can state it, that I can do more work with the block taken out, than before it was taken out, about three rails per day on an average.

Int. 15. Please give your reasons for this statement.

A. My reasons are, that it does not upset the rail, and I do not have to open the holes to chip out the part of the rail which is upset to make the fish-plate fit.

Int. 16. In cutting off the patch, when it is welded on to the rail, what advantage, if any, is there in having a bottom support to the rail?

A. I cannot see that there is any advantage in having a bottom support to the rail.

Int. 17. Do you or not know, from actual experience, that no bottom support is necessary in cutting off a patch?

A. I know that is not necessary.

Int. 18. Why not?

A. For the bottom is no use to it that I can see.

Int. 19. Where does the rail get its support while putting on the patch and cutting it off in the vise or block now used by you in Upper Sandusky?

A. It gets it from the jaws.

Int. 20. Where on the jaws does it get its support?

A. From the top of the jaws.

Int. 21. Do you or not use the jaws in cutting off the rails where no patching is required?

810 A. No, sir.

Int. 22. What do you use for supporting the rail while cutting it off?

A. The top of the block.

Int. 23. Assume that the rail marked X, and put between the jaws, is the lowest or smallest fish-plate now, as used on the Pittsburgh and Fort Wayne road, can you or not, in the same jaws, repair iron of greater height where there is no bottom support?

A. Yes, sir.

Int. 24. Please state why.

A. There is a vacancy of nearly half an inch from the block to the bottom of the rail when the rail is in the block.

Int. 25. Could you or not repair fish-bar rails of different heights without difficulty in a machine that fitted the bottom of the smallest size of fish-plate rails?

A. No, sir.

Int. 26. Why not?

A. Because it would upset the neck of the rail and close the holes.

Int. 27. Were you to repair rails for the Pittsburgh and Fort Wayne Railroad by the job or piece, which block would you prefer—one that gives a support to the bottom, or one that does not?

A. I would prefer the block which gives no support to the bottom of the rail.

Int. 28. Please give your reasons from actual experience and knowledge.

A. My reason is that I can do more work and with less labor than before the bottom was altered.

Int. 29. Why with less labor?

A. Because before the block was planed out, I had to take an extra heat on every rail that was repaired, so as to make it fit the replaced part as the rail would upset, and it had to be chipped out.

811 Int. 30. In repairing the common T-rail or chair-iron, is it or not advantageous to have the rail supported on the bottom while putting on the patch and cutting it off?

A. Well, I do not think it is of any advantage to have it supported at the bottom.

Int. 31. Is it or not sufficient that it have a support against the neck and under the head as seen in model Ft. Wayne vise and Ft. Wayne rail therein?

A. Yes, sir.

Int. 32. Then you want no bottom support for the rail in any case, nor under any circumstances. Is that your experience or not?

A. I want no bottom support for patching. I should want a bottom support to cut the rail off. I want a level block of iron of some kind to lay it on.

Int. 33. Then the jaws of the vise are not necessary for cutting off iron. Is that your experience or not?

A. No, sir; I do not think they are.

(The complainant objects to each and every of the foregoing interrogatories and to the several answers thereto in regard to the use, or opinion in the use, of the machine with the bottom on, as incompetent and irrelevant to any matters in issue in each of the foregoing cases.)

Cross-examination:

X Int. 1. When and where did you first commence these experiments you have spoken of in your direct examination.

(Question objected to for the reason that the evidence shows that it is not an experiment.)

A. It was about 2 months since, as near as I can recollect, at Upper Sandusky.

X Int. 2. Do you know for what reason the bottom was ordered to be taken out and by whom?

A. I have never made any inquiries about it, only I heard that there was some difficulty about the patent.

812 X Int. 3. When did you hear that first?

A. I do not exactly recollect when it was; about a year ago.

X Int. 4. Did you hear that your company had been sued for the use of the patented machine for making railroad-rails?

A. I did, sir.

X Int. 5. How long have you worked at the business of patching and mending railroad-rails, and at what places and for what companies?

A. A little over six years in patching and mending rails at Upper Sandusky, for the Pittsburgh, Ft. Wayne and Chicago Railroad Company.

X Int. 6. Has this been your only employment, patching and mending rails, for the past six years?

A. This was my principal employment the most of the time, although I worked at some other work for them.

X Int. 7. What wages do you get? Are you foreman of the rail-fire?

A. I get $2.25 per day. I am foreman of the rail-fire.

X Int. 8. State how much coal you use per day in patching rails at one fire and the kind of fire used and how blown.

A. I do not know how much is used; we use coke; it is blown by a blast; I never measured or counted the number of bushels used.

X Int. 9. Are you acquainted with S. M. Whipple, who has been examining you; if so, when did you first make his acquaintance?

A. I have seen him, but I have never been acquainted with him more than what I have seen him here.

X Int. 10. When did you first see him?

A. I think I saw him about a month ago, perhaps less.

X Int. 11. Did you have any conversation with him in regard to your giving your testimony in the use of the machine with the bottom out? if so, state it.

A. No, sir; I did not.

813 X Int. 12. Do you know who gave the orders to have the bottoms cut out of this machine for the purpose of making these experiments?

A. No, sir.

X Int. 13. Do you consider yourself a practical blacksmith?

A. Yes, sir.

X Int. 14. What name or term do you give to the contrivance used at your shop to repair railroad rails?

A. The rail-block, commonly called.

X Int. 15. Did the blocks or jaws fitting the sides of the rail come up to about the center of the crown when used with the rail resting on the anvil, as see in the Fort Wayne vise and Fort Wayne rail models as now represented by the slide H placed in the vise so that the rail rests on it?

A. I do not know whether it did or not, as I never measured it.

X Int. 16. Did the block or jaws fit the sides of the rail perfectly and come up under the crown or tread of the rail while resting on the bottom before it was cut out?

A. No, sir.

X Int. 17. Why not?

A. It appears to me that the rails were higher than the jaws and sometimes stuck up above them about a quarter of an inch.

X Int. 18. Do you have different height and shape of fish-joint rails on the Pittsburg, Fort Wayne & Chicago Railway?

A. Yes, sir.

X Int. 19. Did the machine, as used, before the bottom was out, fit any pattern of rails perfectly, coming up to the center of the crown?

A. I noticed that it never fitted any rail that came to the shop; this was my experience; it did not fit it perfectly as it should have done.

814 X Int. 20. Was not this the reason which caused the rail to upset, while patching it before the bottom was out?

A. I think it was.

X Int. 21. Did you ever report to any of the officers of the road that difficulty?

A. I think I did.

X Int. 22. What did they say?

A. I do not remember what they said; they paid no attention to it.

X Int. 23. When did you first make such a report?

A. I made that report soon after the block came to the shop at Upper Sandusky; I should think some four years or more ago.

X Int. 24. Did you ever make it more than once, and to whom did you make such report?

A. I do not know that I made it more than once; I made it to the supervisor of that division, Michael Moran.

X Int. 25. What reply did he make to you?

A. I do not recollect what reply he did make.

X Int. 26. Did you ever repair rails on the anvil or swedge block?

A. I did; I have worked in a piece of frog.

X Int. 27. If you take away the blocks or jaws in the machine, and have nothing but the bottom of the anvil to rest on, what kind of a business would you make in repairing the fish-joint rails?

A. I am sure I could not patch them, but I could cut them off.

X Int. 28. How did you use to cut off the rail when occasion required it? did you place it in the jaws or on the top of the anvil previous to using the machine with the bottoms out?

A. We cut off the rail in the jaws.

X Int. 29. Why?

815 A. Because we thought we might cut it off there as well as anywhere else, because we could hold it faster.

X Int. 30. Did you ever cut off a rail placed in the jaws since the bottom was taken out?

A. I did.

X Int. 31. What was the result as to the rail?

A. The result was that it left a kind of an edge on the bottom of the rail, after it was cut off, turned down.

X Int. 32. How many rails did you ever cut off with the bottom out of this machine, and why do you not use it, the same as you did before, for cutting off the rails?

A. I do not know, as I never kept an account of them. I do not know why I do not use it.

X Int. 33. In patching a rail in the jaws with the bottom out, does it change in any way the configuration of the rail below the center of the crown up to where the jaws fit the rail, at the center of the head?

A. No, sir; it does not that I could notice.

X Int. 34. In no particular does the rail come out precisely the same when it comes out of the jaws as when it went in, after hammering the patch on?

A. It does not change at all.

X Int. 35. If you were going to weld two pieces of iron together, or one piece on the other, would you, as a practical blacksmith, put it in the jaws of a vise or on an anvil?

A. That depends entirely on the two pieces of iron that I would have to mend. If I had to weld a piece of iron on the rail I would sooner have it in the jaws, and in welding any other piece of iron I would sooner have the anvil.

X Int. 36. Why would you rather have the anvil for welding other pieces of iron?

A. Because I think it the most proper place to work on.

X Int. 37. When the pieces of iron are heated to a welding-heat and placed in the jaws, for the purpose of welding together,
816 would not the iron be driven down between the jaws, while hammering on the top of it?

A. No, sir; not that I could see.

X Int. 38. Are you positive of that?

A. I am positive; I have tried it too often.

X Int. 39. Are you as positive to all you have testified to in this deposition as you are, and have so answered the last interrogatory, that two pieces of iron placed in a vise for the purpose of welding them together will not be driven down any while hammering on the top?

A. I am more positive of the last than I am of the others, as some of them are hearsay.

Re-direct examination:

Int. 1. Assume that rail marked Ft. Wayne rail is one inch high, and that it is a quarter the size of rail now used on the Pittsburg, Ft. Wayne Road, how high is the rail from the bottom of the rail?

A. It is 4 inches high.

Int. 2. In bringing this rail, which is 4 inches, to a welding-heat, how much will it expand—what part of an inch, as near as you can judge?

A. I do not know, as I never measured it.

Int. 3. What is your judgment in regard to it?

A. My judgment is that it will expand some, but I cannot say what part of an inch it will expand, as I never measured it.

Int. 4. If the jaws are made to perfectly fit the rail, both under the bottom, at the sides, and under the head when cold, where will the expansion, when heated, wherever it is, show itself, when placed in the jaws for welding the patch?

A. It will show itself on top, I think.

Int. 5. How will it appear under the head; will it be tight as when cold, or will there be a little vacancy under the head equal to the expansion, or not?

817 A. There should be a little vacancy above the jaws of the block under the head of the rail.

Int. 6. As much as the rail expands?

A. I should think so.

Int. 7. How, then, will the neck of the rail be affected with this va-

cancy underneath the head and above the jaws when you come to weld the patch on the rail, the rail having a bottom support, as seen in the Ft. Wayne vise, resting on the movable bottom H?

A. It will not affect it any as I can see.

Int. 8. Will it or not upset the neck equal to the space underneath the head which represents the expansion of the rail?

A. Yes, sir; it will upset it.

Int. 9. Suppose I now take out the bottom H, will there then be any upsetting of the neck by the expansion of the rail while welding on the patch?

A. No, sir.

Int. 10. Suppose the rail is four and an eighth inches high, could you patch the rail without upsetting the neck, in a block fitted or adapted to a four-inch rail having a bottom support?

A. No, sir, you could not; as it is an eighth of an inch higher it would drive it down an eighth of an inch in the jaws.

Int. 11. In what way could the machine or vise be so altered as to enable you to repair the four and an eighth inch iron in a block adapted to a four-inch iron without upsetting the neck?

A. By planing out the bottom so as to give the rail a chance to hang on the jaws without touching the botton.

Int. 12. Then, to compensate for expansion of iron and different height of iron on which the fish-plate are used, must you remove the bottom or not, and let the rail be suspended by the jaws of the vise?

A. You must remove the bottom and let it hang on the jaws.

Int. 13. Is all you have testified to in this redirect examination the result of your knowledge and experience or not?

818 A. Yes, sir; it is the result of my experience and knowledge. (The same objections as before.)

Recross-examination:

X Int. 1. Please describe the fish-plates used on the Pittsburg road as to length, height, thickness, and configuration.

A. I do not know the length, height, or thickness of them, as I never measured them.

X Int. 2. Have you ever seen them; if yea, what do they look like?

A. Yes, sir; they look like pieces of iron used for bolting the fish-plate iron.

X Int. 3. How wide is the fish-plate neck between the crown and flange of the rail?

A. I do not know; I never measured it.

X Int. 4. About how thick is the neck of the rail?

A. I do not know, sir.

X Int. 5. Is there any difference in the shape between the neck of a fish-joint rail and the old-fashion T-rail or chair-rail; and, if yea, what is that difference?

A. There is a difference. The difference is, one rail is intended to be spliced and the other is not. I do not know as there is any difference in the thickness at the neck; the fish-rail is higher in the neck than the chair-rail, I should say about half an inch, perhaps more, from the appearance of it. The chair-rail has no holes in them and don't be fastened on the track with splices but with chairs; there is more of a curve in the chair-rail, while the fish-plate rail has perpendicular sides.

X Int. 6. Do you frequently, in repairing rails, have to repair them at both ends?

A. Yes, sir.

X Int. 7. And middle also?

A. Yes, sir; when we meet a rail that is not broke too far back in the middle, we repair it.

819 X Int. 8. Do you scarf the rail when you repair it?

A. Yes, sir.

X Int. 9. How much did you ever put on at one welding heat in the machine?

A. From twelve to sixteen inches.

X Int. 10. How much did you ever repair on one railroad-rail in feet or inches, as near as you can judge?

A. I could not tell exactly, as I never keep an account of it. I might have put on twenty-four or twenty-five inches on some rails. I cannot tell, as I never measured it.

X Int. 11. What is the usual length of a weld that you put on in repairing rails, as near as you can judge?

A. Take it on an average, I do not think we put on more than six inches on an end.

X Int. 12. Do you put on more or less now than you used to?

A. We put on more now.

X Int. 13. Why?

A. From the fact that the block is in better working order than it used to be before it was planed out.

X Int. 14. Does it make any difference as to the length of the patch required on a rail by using any kind of a machine to repair the same in?

A. I do not know as it makes any difference.

(Signed) FRANK FITZGIBBON.

ISAAC HOOPER.

Int. 1. What is your name, age, residence, and occupation?

A. My name is Isaac Hooper. My age is forty-six years. I reside in Lima, Ohio. I am a blacksmith.

Int. 2. How long did you work at the blacksmithing business, and did you learn the trade of blacksmithing?

820 A. I have worked at it since 1840. I did learn the trade.

Int. 3. What is your present employment, and in what capacity are you employed?

A. I have charge of the blacksmithing and rail-fixing at Lima for the Pittsburg, Fort Wayne & Chicago Railway Company.

Int. 4. How long have you had charge of that shop?

A. Four years and six months.

Int. 5. Have you had charge of any other blacksmithing or rail-mending for said company, or for any other company; if so, when, where, and for what company?

A. I had charge of their rail-shops at Fort Wayne for a year and two months. I think it was in April, 1863, to June, 1864. I went from Fort Wayne shops down to the Lima shops.

Int. 6. Did you ever have any experience in a blacksmithing and rail-mending shop in any other capacity than as foreman? If so, state where and how long, and in what capacity.

A. I have acted in capacity of foreman at blacksmithing previous to the taking charge of those, but I have not acted in capacity of foreman of rail-fixing previous to this time.

Int. 7. Was rail-mending carried on at the Fort Wayne and Lima shops during the time you had charge of them?

A. Yes, sir.

Int. 8. What was the kind of rail in use in that part of the Fort

Wayne roads, and which were being mended at the Lima shops when you took charge of it?

A. The chair iron-rails.

Int. 9. Was it the common T-rail or the U-rail?

A. It was the T-rail.

Int. 10. Was there any change made in the kind of iron used upon the road; and, if so, *and* when and where, if at all, did you begin to mend the new iron?

A. There was a change made. I cannot tell exactly when the
821 change was made. I can tell when I began to fix it; it was about two months after I took charge of the shop at Lima.

Int. 11. What was the new iron so introduced?

A. It was called by various names; some called it the fish-joint; some called it the bolted iron; the rolling-mills called it fish-joint.

Int. 12. How did it differ from the common T-rail?

A. It was higher in the webb, as it was called, or the webb is higher; it has holes for bolts that hold the straps on the joint; the webb is much higher than the T-rail.

Int. 13. How are such rails fastened together when laid on the track?

A. They are fastened together by the straps on each side of the rail, with seven bolts through them at the joints.

Int. 14. Are these straps flat, and how do they fit upon the rail?

A. They are flat pieces of iron, and fit between the flange and the ball of the rail.

Int. 15. Look at the model of rail attached to the model marked Ft. Wayne rail, and state whether or not it is a fair representation of the rail to which you have referred?

A. It is a correct model, I should think, as far as I can see.

Int. 16. At the time you took charge of the Lima shops was there any machine in use for the purpose of holding the rail whilst it was being mended; and, if so, give a general description of it?

A. We had a block similar to the model marked Ft. Wayne vise; we got the jaws altered to fit the fish-joint iron, or we got a new pair of jaws to fit the old block to fit the fish-joint iron; the old jaws fit the chair or the T railroad iron. This was the only change we made at that time.

Int. 17. In the use of the old block for the old iron, how was the iron supported when resting in the block for mending?

A. It rested on the bottom and sides.

Int. 18. In changing it to fit the fish-joint rail, how was the fish-joint rail supported.

822 A. In the same way at first.

Int. 19. What, if any, difficulty resulted from this manner of supporting the fish-joint rail?

A. It shortened the webb of the rail where the strap came, and prevented the strap from fitting.

Int. 20. What effect had it, if any, upon the holes?

A. It stoved the holes up, or made the holes smaller.

Int. 21. What did this compel you to do after the mending was completed?

A. We had to chip out the space where the strap fitted in, and to do this we had to heat it.

Int. 22. What was the cause of this cramping of the neck of the rail?

A. It laid on the bottom of the block.

Int. 23. Has any change, and if so what has been made in those machines, and with what result?

A. We cut out the bottom bearing, so that it would hold entirely on

the ball of the rail; that prevented it from stoving up or this place from getting stout, and kept the holes all right.

Int. 24. What amount of space is left in the machine as thus changed between the bottom of the rail and the anvil underneath?

A. In some we have half an inch, and in one of our blocks we have an inch below the rail.

Int. 25. Look at the models marked Fort Wayne vise and Fort Wayne rail, the rail being placed between the jaws of the vise, and state whether or not they correctly represent the relations existing between the jaws and the rail during the process of patching in the machines in use in the Lima shops?

A. That is a correct representation of the block we are using; it represents the condition of the rail and the relations between the jaws and the rail while patching.

Int. 26. As the rail now lies between the jaws, is there any support for the bottom of the rail?

823 A. There is no support for the bottom of the rail; we do not need any for patching it.

Int. 27. In the actual operation of patching the rail, as carried on in the Lima shops, is there or not any bottom support for the rail?

A. There is no support for the bottom of the rail in the blocks we use there now.

Int. 28. As a practical man in the business of blacksmithing, state whether or not, in your opinion, a bottom support is necessary or desirable during the process of patching.

A. A bottom support for patching is a disadvantage to that kind of a rail for patching.

Int. 29. What are your reasons for saying so.

A. I have tried them both ways, and I know that they work better without the rail lying on the block on the bottom; if it lays on the bottom it drives the rail together, and I cannot get the splice in without trouble.

Int. 30. What difference, if any, is there in the amount of *of* patching which can be done with and without the bottom support per day by a single set of men.

A. You save one heat on each end of the rail when we have no bottom support, which would be about twenty-five heats a day; it takes from three to five minutes to make a heat, which would make a difference, I should think, in the course of a day of two or three rails.

Int. 31. How has the business of mending rails been done at the Fort Wayne shops that you are familiar with.

A. By the day or by the hour.

Int. 32. Has it ever been done by the job or by the piece to your knowledge?

A. It has never been done by the job or piece in my time.

Int. 33. What kind of a fire has been used in the Lima shops?

A. We used what is called a rail-furnace, heated by coke, with a fan-blast.

824 Int. 34. How many men are employed at one fire in the mending of rails?

A. Three men; one blacksmith and two helpers.

Int. 35. What number of hours constitute a day's work?

A. Ten hours on that road.

Int. 36. How many rails per day of ten hours are mended in the Lima shops by one set of men on the machine before the bottom support for the rail was taken out?

A. Well, it depends altogether how much we have to do a rail; we, I believe, averaged about 12 or 13 rails a day with one fire and one set of men.

Int. 37. What amount of patching was done upon the rails on an average?

A. Well, I suppose, take the general run of the rails as we get them, good and bad, they would average four inches to the rail on patching.

Int. 38. Did they cut off rails; at what shop?

A. Yes, sir; we always cut off more or less rails.

Int. 39. What number of rails per day of ten hours do you mend in the Lima shop with one fire and one set of men upon the machine without bottom support for the rail?

A. We mend from 14 to 16.

Int. 40. How does the work as to quality compare with that done before the bottom support was taken away?

A. I think it is as good, perhaps a little better, from the fact that we do not have to enlarge the holes, as when we have to enlarge the holes the rail is apt to split.

Int. 41. Are the jaws necessary or desirable when you have merely to cut off a rail without patching it?

A. When we have nothing to do but cut off the rail and dress up the end, we can get along faster just on a plain block or plate, as we have not got the lever to lift up and down. We were just using the plain block for cutting off rails a great part of the last summer.

825 Int. 42. Is there or not any difficulty, in cutting off the patch, squaring off the end of the rail in the jaws without the bottom support for the rail?

A. There is no difficulty in squaring up the end of the rail after putting on the patch, as there is nothing to cut off except the small end of the patch which sticks out.

Int. 43. In your opinion, is a bottom support for the rail necessary or desirable when the rail is of the common T form, during the process of patching?

A. It is more necessary to have a bottom support for that kind of a rail than any other.

(The complainant objects to each and every one of the foregoing interrogatories, and to the several answers thereto, in regard to the use, or opinion in the use, of the machine with the bottom out, as incompetent and irrelevant to any matters in issue in each of the foregoing causes.)

Cross-examination:

X Int. 1. Have you ever repaired railroad-rails yourself? If yea, where, when, and how long?

A. I have been repairing them at times since 1864, at Ft. Wayne, Indiana, and at Lima, Ohio. I have not been repairing continuously myself all that time, but have had charge of it, frequently filling the place of rail-fixer in his absence.

X Int. 2. About how much of the time since 1864 have you worked steady at the business of rail-patching?

A. I cannot answer that question, as I cannot tell. I may have worked an hour in a day, two or three hours, five hours, just as the case might be in the absence of the rail-fixer.

X Int. 3. How many machines did the Pittsburgh, Fort Wayne and Chicago Railroad have in operation and in use for that company since you have been employed there?

A. We had two in operation at Fort Wayne while I was there. A part of the time—perhaps two-thirds of the time—I have known
826 of two at Fort Wayne, two at Lima, and one at Upper Sandusky. They were not used all the time; just used when we had rails to be repaired. For a portion of the time we threw the block altogether, as we were not patching, and used the plain, flat blocks or piece of cast iron.

X Int. 4. Do you know of their repairing rails on the eastern division from Lima to Pittsburgh, or have you heard of their doing so?

A. They repair rails from Lima to Crestline, but I have never heard of their repairing rails on the Fort Wayne Road east of Crestline.

X Int. 5. Were you employed in patching rails while you were at Fort Wayne, or what was your employment while there?

A. I had charge of patching rails and of all the blacksmithing done or being done in the shop, which consisted of road-rail and car-work, fixing frogs, etc.

X Int. 6. Was the repairing of rails done in the same shop that the other work was done in?

A. It was all done in the same shop.

X Int. 7. How did you make frogs and put steel on them?

A. We made them on the anvil. We used no rail-frogs on that road—at least not on the western division. We plate the face of the casting with steel, which is done on the anvil.

X Int. 8. About what is the difference in height of the different patterns of rails used on that road since you have been there?

A. The bolted iron or fish-plate is about three and one-eighth to four inches, and sometimes varies from one-eighth to a quarter of an inch. The common T-rail or chair-iron is about three and five-eighths or three and three-fourths; some may be a little over this. I am speaking now of the rail before they are worn away.

X Int. 9. Is there any difference in the size or thickness of the head of the different kinds of fish-joint rail?

A. There is a difference; every rolling-mill have *their* own par-
827 ticular patterns for the heads of rails. At Cleveland they are quite different from the Pittsburgh or Johnstown rail. The heads of the rail of the Alliance bar differ more materially than any of the others, the head being very near a perfect circle.

X Int. 10. Explain the difference in the heads of the other kinds you have spoken of.

A. This model marked Fort Wayne rail is about the shape of the Johnstown iron; the Cleveland bar has a sharper corner under the head of the rail; the difference in the head of all three of these patterns—the Cleveland, Pittsburgh, and Johnstown—is in the top or crown of the rail, except, as I said before, the Cleveland, which has a sharper corner or more abrupt curve under the head.

X Int. 11. Taking railroad-rails of the fish-joint pattern of the same height, how much difference would there be in the length of the neck of a round head from one that has a nearly sharp corner under the crown of the head?

A. There is a difference of an eighth of an inch, and in some cases a little more.

X Int. 12. What special pattern of rail was intended to be repaired in the machine you used before the bottom was taken out?

A. I believe the jaws were made to fit the Cleveland bar, as that kind of iron was used to the greatest extent, and was being repaired at that time on the road.

X Int. 13. What is the height of the Cleveland rail?

A. About 4 inches, although it differs some; I cannot tell exactly how much. When the rolls get worn the iron is large.

X Int. 14. Did you ever measure it?

A. Yes, sir; I have measured it.

X Int. 15. How high up the sides of the rail do the jaws come towards the top of the corner of the rails to give support to the same in all the different patterns you have spoken of before the bottom was taken out?

828 A. Some of the rails it would come up very near to the centre, while in others it would not come up or touch at all on the crown of the plate-rail; this was caused by the flange of the rail being thinner and the web higher.

X Int. 16. How much space would there be left between the bearing surface on the top of the jaws and the under side of the head of the rail of those that came up higher than the jaws you have spoken of?

A. I have never measured that space.

X Int. 17. About how much difference, to the best of your knowledge and belief?

A. In some about an eighth of an inch, in others more; while in some again there is but little difference. We do not get rails all alike even from the same mill, and we could not make a machine to fit exactly all the rails or fish-joint rails rolled at the same mill.

X Int. 18. In repairing the pattern of the kind of rail which you have spoken of, the jaws coming up to the center of the crown of the same, the bottom resting on an anvil, would the neck of the rail be upset by repairing it?

A. Yes, sir; it would.

X Int. 19. Why? Give your reasons.

A. From the fact that the rails expand when heated; a rail with a heavy web, as the Cleveland bar, expands more than any of the other rails to which I have referred, while the Cleveland bar, from the same mill, varies in the thickness of the web from an eighth to a sixteenth of an inch.

X Int. 20. How much will a rail expand, when heated, in height?

A. That depends altogether on the kind of iron. I have known iron of the same thickness and size, in every particular, to expand more than the same kind of a bar of the same dimensions. Iron differs just as much as timber does, no two banks of ore producing the same kinds of iron. I cannot say how much it expands. I have measured some that was heated to a red heat which expanded an eighth of an inch, while other rails of the same kind would not expand to any perceptible extent.

829 X Int. 21. When and where did you make this measurement as to the expansion of the rail?

A. It was in the latter part of 1866, when I commenced to mend the fish-joint iron at Lima, Ohio.

X Int. 22. What led you to this measurement?

A. After we got a pair of jaws made for the fish-joint iron, fitting the bar when cold perfectly, we found that our straps or splices would not go in.

X Int. 23. If the jaws came up and fitted the crown of the rail correctly when cold, the bottom resting on the anvil, how could the neck of the rail be made any shorter after it had been repaired?

A. When the rail is made hot it expands, as I said before, and it is driven down while repairing it, just as much as you upset it in repairing it; to that extent it will be short in the neck.

X Int. 24. Where is it driven to, and how can it be made shorter in the neck after it is repaired, if the jaws fitted correctly when cold?

A. It is driven down on the block; all the blocks that I have ever used, as you will observe by the model marked "Ft. Wayne Vise," has lost motion; as the rail cools in working it the jaws are forced apart; this is the only reason I can account for the shortening of the neck after it being fitted in the block; the iron contracting is very powerful.

X Int. 25. Please describe the machine which you have referred to, as near as you can, as to the weight of the machine, length of jaws, and weight of same.

A. It would be impossible for me to give you the weight of the machine, as I have never seen it weighed; the length of the jaws are about two feet on the blocks that we have been using.

X Int. 26. About how heavy is it, to the best of your knowledge?

A. I should think it would weigh, when all together, from 1,000 to 1,200 pounds, as the model represents it.

830 X Int. 27. About how heavy is the ball and lever which is used to keep the movable jaw closed, and the length of the lever?

A. I cannot give you the weight of that lever; the ball on the end I have never weighed nor seen weighed; the ball may perhaps weigh twenty, twenty-five, or thirty pounds; there is no uniform length that I have observed in the length of the levers.

X Int. 28. In heating a rail to be patched, is the neck, crown, and flange all heated to the same degree of heat?

A. No, sir; it is heated to a welding heat on that part which is to receive the patch; the other parts are very near brought up to a melting or welding heat.

X Int. 29. How much can you bring up to a welding heat in the furnaces used by you at Lima, in feet and inches?

A. We can take a welding heat on a piece of rail or any other pieces of iron, about from twelve inches to sixteen inches; we can heat more or twice as much at one heat as we can work off.

X Int. 30. Were you present yesterday, and did you hear O. A. Simons give his testimony?

A. I heard a part of it; the latter part of it.

X Int. 31. Did you hear that part of it where he stated how much was planed out of the machine in use at Lima and Upper Sandusky?

A. Yes, sir; I heard that part or a part of it; but I do not distinctly remember how much was planed out of the machine, as he spoke very low and I did not hear him distinctly.

X Int. 32. How much was taken out of the bottom of the machine used at Lima, and when and who ordered it so done?

A. On our own machine there was half an inch taken out full, perhaps a fraction over; the other one that went to Sandusky there was full three-fourths of an inch taken out; it seems to me, though I have never kept the date nor made any note of it, that it was in September some time. D. C. Richmond, the supervisor, directed me to have it loaded on the cars.

831 X Int. 33. How do you know as to the amount that was planed out of the machine which you have spoken of?

A. I measured them after they came back.

X Int. 34. Was the one sent to Sandusky sent to Lima first and then reshipped to Sandusky?

A. The one that came to Lima first remains there still; the next one that came was thrown off at Lima by mistake, and reloaded and sent to Sandusky.

X Int. 35. What led you to be so very particular as to how much had been taken out of the machine that was going to Sandusky?

A. I wanted to see if it corresponded with the one that we were using.

X Int. 36. What interest was it for you to know?

A. I had no interest; it was only my curiosity.

X Int. 37. When did you hear there was any controversy in regard to this block?

A. I cannot say when I first heard it. I think I heard it in 1863, from the fact that Mr. Slocum, who appointed me as foreman, there stated to me on my remarking one day that it was a pretty good idea, he remarked to me it was a good thing now since he had improved on it. I asked him what he had done; he told me he had introduced these pieces at the end of the bottom support in separate parts, so that when they would wear off he could take them out and put in new ones. I asked him why he did not leave more room in the bottom; he told me he thought it was about right the way it was. I asked him where he got the idea of a block; he told me it was used on the Cleveland & Columbus Road. I told him it was good but was not right yet—that it would not do all kinds of rails, and I understood him to say at that time that he was the inventor, and he never told me to the contrary. I heard afterwards that he was not.

832 X Int. 38. What position did Mr. Slocum occupy on the Pittsburgh & Fort Wayne Road at the time he told you this, and what was his business?

A. He was principal foreman of all the blacksmithing at Fort Wayne.

X Int. 39. If you discard the jaws which support the sides and under part of the crown of the rail while patching, what would be the effect having the rail supported only at the bottom while patching it?

A. In patching the rail the jaws clasping it under the crown is the proper tool for patching rails. If the rail has no side support you cannot patch it and make a good job of it without giving or taking considerable time.

X Int. 40. Do you keep an account of the number of rails repaired at your shop; if yea, to whom do you render such an account, and how often?

A. Yes, sir; we kept an account of the number of rails repaired, but not very correctly. We keep an account of the number patched. We render this account to D. O. Richmond, the supervisor of that division, or subdivision, once a month.

X Int. 41. About how much coal or coke do you use at the rail-fire per day? State as nearly as you can.

A. We use coke. I have never measured it at all, but should thing we used six, eight, or ten bushels.

X Int. 42. What does the coke cost per bushel?

A. That I cannot say, as I have never seen the bill.

Redirect examination:

Int. 1. Mr. O. A. Simonds, whose name has been referred to in this cross-examination, has testified in his deposition that you made of him certain requirements which involved the sending the machine to Fort Wayne in order to have planing done on it; that he would probably have done the planing had there been an iron-planer at Lima. What were the requirements and what the difficulties you had to encounter in patching rails which led you to make such requirements; please

833 explain fully this matter, and state the time as near as you can, and the circumstances connected with the matter as near as you can.

A. After we commenced to patch fish-joint rails I told him that we could not get the straps or splices to fit; that the supervisor complained to me that we were not doing our work well. I told him what the difficulty was; that the rails by patching them became upset under the neck or in the neck. I took a piece of chalk and showed him on the end of the block where it should be planed down to. He turned around on his heel and made no reply. This occurred some time in the summer of 1865. I was fireman there; am required to use just such tools as they furnish me outside of what I can make myself, and am powerless to supply myself with others without their consent; if they do not answer the purpose as well, all I can do in that case is to make complaint or report the same to the supervisor or Mr. Simonds.

Int. 2. What alteration, if any, would you have made in the machine for repairing rails had the matter been under your direct charge and supervision, to obviate this difficulty of upsetting the neck of the rail in patching the same?

A. I would have done what has been done—plane out the bottom; thus we have no bother or trouble.

Int. 3. By planing out the bottom, so as to give no bottom support to the under side of the rail when in the jaws for patching, can you or not repair the different heights of fish-plate iron used on your road, and at the same time preserve the neck so that the fish-plate will fit as well when it comes out of the jaws as it would when it went in, though the crown of the rail may vary somewhat in configuration, as explained in your cross-examination?

A. By having the bottom planed out or taking out the bottom support we can mend or patch any kind of a rail that we have on our road, without regard to the configuration of the ball of the rail; do it as well, with less difficulty, and more of it than we could before the bottom was planed out.

834 Int. 4. What kind of a rail do you now patch on your road?

A. We patch fish-joint iron sometimes, not very frequently; we put a patch on chair-iron, or the old T-rail.

Int. 5. Do you have a block on purpose to repair chair-iron on?

A. We have a block with the bottom out the same as this for repairing chair-iron.

Int. 6. If your block or vise is adapted to the neck of a rail that is 1⅛ or 1¼ of an inch between the crown and the web, can you repair other fish-plate rails with a longer neck, even to two or three inches, provided that the block is planed out sufficiently to allow the rail to hang suspended in the jaws or not? Please give your experience in this matter.

A. With the bottom support taken out sufficiently we can mend, repair, or patch any rail without difficulty that we have on our road.

(Same objection as noted in the direct examination.)

Recross-examination.

X Int. 1. Have you ever repaired any rail in the machine since the bottom has been planed down? If yea, how many?

A. Yes, sir, I have. I cannot say how many. I never kept any account of them.

X Int. 2. About how many, or how much time have you spent repairing rails in the machine since the bottom was planed out?

A. I cannot tell how many I have repaired; that would be impossible. I am around the blocks assisting, sometimes doing some part of the work, and taking particular notice of how it is done. As I am not paid for patching rails, it is not very likely I would patch many.

X Int. 3. Have you taken more special pains to notice of the repairing rails since the bottom was planed out than before?

835 A. I have taken about the same care and notice in fixing the rails as I have always done previous; if any difference, not so much, as they do not require much care now, as the men fixing them cannot well go wrong.

X Int. 4. Does it in any way change the configuration of the rail in any place when there is no bottom support while patching?

A. The rail, while it is being patched, always adapts itself to the upper part of the jaws. Whatever the configuration of the dies are, or the jaws when the rail is suspended for patching, will be the shape of the under side of the crown of the rail immediately under the patch. If we are mending a rail of the same shape or curve of the jaws of the block, there is no alteration made.

X Int. 5. Is there any change in any way of the configuration of the rail below the crown where it hangs suspended, as you have stated, during the process of patching and hammering on the crown below it to the bottom of the flange?

A. There is no perceptible change except what the iron wastes off in heating.

X Int. 6. When the iron is heated, as you have stated, to that high temperature, and suspended by the crown and hammered on, will not the neck elongate?

A. Not that I could ever discern.

X Int. 7. Why not give your reasons as a practical blacksmith?

A. There is a kind of nice point there, and perhaps I can explain it. The hammering on the top of the rail having a tendency to force it down, while at the same time the bottom kind of recalls or forces, upon the same principle that you would upset a piece of iron by heating it in the center or at the end and holding the opposite end and striking on the unheated end.

X Int. 8. What change is there in the configuration of the rail when it hangs suspended by the crown while being patched and not being supported at the bottom?

836 A. I hardly know how to answer that question further than I have done. I might say, whatever the shape of the top of the jaws are will be the shape of the under side of the ball of the rail.

X Int. 9. Does it disturb or in any way change the neck or flange of the rail from the under side of the crown of the rail to the bottom while you are hammering a patch on the corner when heated to the degree you have spoken of?

A It does not.

X Int. 10. What prevents the rail from settling while being hammered, it having no bottom support?

A. The upper part of jaws?

Redirect examination:

Int. 1. Is it the tendency of the hammering on the top of the rail in putting on the patches to lengthen or shorten the neck when the rail has no bottom support?

A. It leaves it about the same.

Int. 2. Is the tendency one way or the other, or neither, as indicated in your answer to interrogatory 7, recross?

A. The tendency is neither; the two forces make it equal.

ISAAC HOOPER.

837, 838 United States circuit court, northern district of Illinois.

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL RAILROAD COMPANY AND John M. Douglas. } In chancery.

And in other cases, as per stipulation between the parties on record herein.

839 *Testimony.*

Depositions of William Cullon, William Benedict, and A. Congdon, witnesses on behalf of defendants, taken at Cleveland, Ohio, January 6th, 7th, and 8th, 1870, before Charles Robinson, United States commissioner.

S. M. Whipple, counsel for defendants, and complainant, S. H. Turrill, in person.

WILLIAM CULLON, of lawful age, being first duly cautioned and sworn, deposes as follows, to wit:

Int. 1. What is your name, age, residence, and occupation, and how long have you been so occupied, and for whom during the time?

A. My name is William Cullon; my age, forty-one years. I reside at Kingsville, Ashtabula County, Ohio. I am a blacksmith by occupation, and have been so occupied about twenty-one years. I was first employed in the edge-tool business for E. D. Edgerton, of Painesville, about seven years. Next, I did business for myself about three years. I worked for Whitcomb about one and a half years, commencing in May, 1856, repairing railroad-rails at Cleveland, Ohio. The balance of the time I have been at work for the Cleveland and Erie division of the Lake Shore and Michigan Southern Railroad Company, in the same business of repairing railroad-rails, at Kingsville, Ashtabula County, Ohio.

840 Int. 2. You say you worked for Abel Whitcomb repairing railroad-rails?

A. The machine was made to fit the rail when I worked for Abel Whitcomb.

Int. 3. Do you mean by this that the jaws of the machine and the anvil underneath the rail were made to fit the bottom as well as the sides of the rail?

A. Yes; they were when I worked for Mr. Whitcomb.

Int. 4. Was there any alteration made on the block or machine afterward? If so, what was the alteration?

A. There was. The bottom or support of the rail or anvil or anvil part, was taken off about from one-sixteenth to one-quarter.

Int. 5. Why was this made in the machine?

A. Well, I found some rails the flanges of which were thicker than others, and I supposed it was taken off to receive the flanges of the thick rails, and then when we repaired the low rails it didn't make any difference. The thick-flange rails had a support, and when we came to repair the thin-flange rails we found they had no support; that we could repair the rails just as well without support as with it.

(Complainant objects to the last answer to the question enclosed in parenthesis, as being answered by the counsel for the defendant in substance instead of the witness. Counsel for defendants rejoins that such was not the fact.)

I will say further that the first machines that were fitted over the bottom support was taken out; that is, they hadn't fitted as well as they did when I worked for Whitcomb. After I found these thick-flange rails, there was a little more of the support taken off the bottom.

Int. 6. When you came to repair the thick-flange rails, how much space was there between the bottom of the rail and the anvil underneath?

A. Well, there was about three-sixteenths of an inch.

841 Int. 7. Was not the neck of the rail as well preserved when held in the jaws while the patch was being put on, when there was no bottom support to the rail, as when there was, as in the case of repairing or patching the thick-flange rail?

A. It was.

Int. 8. Since this alteration was made of taking three-sixteenths to one-fourth of an inch from the anvil underneath the bottom of the rail, what further alteration, if any, has been made in said machine or vise for holding the rail?

A. We made an alteration of taking it out more; took it out about two inches.

Int. 9. Look at the model marked "Cleveland Vise," and state what it represents.

A. That represents the one that we work on.

Int. 10. Wherein does it differ from the vise or block first constructed by Abel Whitcomb?

A. Mr. Whitcomb's machine fitted the rail both on the bottom and sides of the rail; this neither fits the bottom nor space in the shank on the high rails; consequently, when they patch a high rail the low rail wouldn't touch the bottoms; there was that advantage, we could repair rails when there was difference in their height, without upsetting the shank.

Int. 11. Do you or not wish to be understood by this, that when the jaws are fitted to hold the rail with a short shank, there being no bottom support, a rail with a longer shank could be repaired in the same vise?

A. Yes, sir.

Int. 12. Could or not such rail with longer shank be repaired in jaws fitted to the rail of a shorter shank, the rail having a bottom support, without upsetting the shank or neck?

A. It could not.

Int. 13. Will you please give your reason why it would not?

A. Well, the bottom of the rail, the flange, would strike the sup-
842 port, and consequently would let the ball of the rail be loose; that is, it wouldn't touch the jaw. The ball of the rail wouldn't touch the jaw; consequently would let it down.

Int. 14. Do you mean by letting down the ball of the rail, the neck or shank would be upset or thickened?

A. It would be.

Int. 15. In such case, would or not the ball have to be brought back to its proper height; and, if so, by what means?

A. It would; swedged out.

Int. 16. How would this swedging out affect the shank?

A. It might crack it sometimes.

Int. 17. What, then, is the remedy for this upsetting the neck or shank when different height of rails are to be repaired in the same jaws?

A. By taking out the support.

Int. 18. At how early a date was this taking out the bottom support

to the rail put into practical operation, according to your knowledge?

A. It was soon after the company repaired their own iron. I guess it was about (9) nine years ago, as near as I can recollect.

Int. 19. Before the company repaired their iron, who did this kind of work?

A. They did it by Abel Whitcomb.

Int. 20. Since he gave up the job, has the company repaired its own iron?

A. I have worked by the piece myself.

Int. 21. How long have you worked by the piece?

A. About (11) eleven years.

Int. 22. Has this bottom support to the rail been out all the time since you commenced repairing the rails by the piece?

A. It has not.

Int. 23. How long has it been out?

A. I should think about eight or nine years.

843 Int. 24. In repairing rails in a vise that gives no bottom support to the rail, do you find any difficulty in cutting off the patch after it is welded on the rail, whilst it is in the jaws? If there are any difficulties, please state them.

A. None in that respect.

Int. 25. Suppose you wish to cut a rail off when no patching is to be done on the rail, do you use the jaws for that purpose or not? Please explain.

A. Do not, now.

Int. 26. Are the jaws necessary in work of cutting off rails?

A. Most convenient.

Int. 27. In the absence of jaws in cutting of rails what do you use?

A. We place the rail right on top of the machine.

Int. 28. Would or not a plain block, on which to rest the bottom of the rail, answer the same purpose?

A. It would answer the same purpose.

Int. 29. Please explain as to whether or not a vise like model marked "Cleveland vise" will answer the same purpose in holding the rails while the patch is being welded on, as though the anvil came up within three-sixteenths or one-fourth of an inch to the bottom of the rail.

A. It would answer the same purpose.

Int. 30. Will or not said vise answer the same purpose as it would did the anvil touch the bottom of the rail, the head or ball at the same time resting on the jaws?

A. Answer the same purpose in all cases so far as putting on the patch is concerned.

Int. 31. You say the machine or vise you are now using, to wit, the "Cleveland vise," has some two inches of the bottom removed. Have you patched rails on such a vise; and, if so, how does the amount of work compare with the amount of work done on the same vise, when but three-sixteenths or one-fourth of an inch was removed from the anvil under the rail?

844 A. Yes, sir; yes, sir. I worked thirteen days last month with the "Cleveland vise," and thirteen days with the other, with three-sixteenths or one-fourth inch out. I repaired eleven rails more with the three-sixteenths or one-fourth inch out than with the two inch. We were two days placing the machine, and fitting up an extra bearing or false support on the outside of the machine. I deducted out the amount of rails repaired those two days that we were fitting up the

machine, from the amount of rails repaired in the thirteen days, which made the balance of the month equal to the first half of the month.

Int. 32. Do you or not mean by your last answer that you are doing as much work per day, or week, since two or more inches or more have been removed from underneath the rail, or when a less space was taken out, to wit, three-sixteenths or one-fourth inch?

A. For the time we worked, I think we have repaired equally as many rails; I mean we have averaged as much in other months; we have averaged as much as we have in the same number of days last year at the same time.

Int. 33. Please state what inconveniences, if any, there are, in repairing or patching rails in the "Cleveland vise," when two inches or more is removed from underneath the anvil, under the bottom of the anvil, compared with a removal of only three-sixteenths or one-fourth of an inch?

A. All the inconvenience I can find is in edging off center patches.

Int. 34. Then there is no inconvenience in the mere patching of the rail; is that what you would be understood?

A. Yes, sir.

Int. 35. The inconvenience, then, if any, is in the dressing off the rail after it is patched?

A. Yes, sir.

Int. 36. Will you please state what that inconvenience is in
845 dressing off the rail after it is patched, and why the inconvenience exists, so far as patching the center of the rail is concerned?

A. The inconvenience is there is no bottom support in the center and we have to draw the rail just the length of the patch to lay on our false support—to dress it off on the side—because there is no support in the center of the machine, when the patches are over nine feet from the end of the rail.

Int. 37. Why did you say nine feet?

A. When it is over nine feet we cannot get it on top of the jaws.

Int. 38. Why can't you get it on top of the jaws?

A. The furnace is in the way.

Int. 39. Please explain how the furnace is in the way.

A. The furnace is higher than the machine, and just opposite the machine; the furnace stands nine feet from the swedge-block, and when the patch is put on the rail, over nine feet from the end, we can't dress it off on the sides on the top of the machine; the furnace is higher than the machine, and won't let it go over nine feet; we dress it with the end in the furnace, with the ball up, and we have to use a false support, and the difference is we have to pull the rail just the length of the patch in order to dress it off on the sides.

Int. 40. Where do you dress off the rail in all cases where the patch is less than nine feet from the ends of the rail?

A. We dress it off on our false support on the top of the jaws in all cases where it is less than nine feet from the end of the rail.

(Complainant objects to the counsel, S. M. Whipple, talking, or suggesting in any way words or sentences to the witness while giving his answers. Having been cautioned by me several times, still he persists in answering or assisting the witness by suggestions after the questions has been put to him by the commissioner.

The said S. M. Whipple rejoins by saying that he claims the
846 right to know that the witness understands the question before he makes answer, and now calls for the questions to be rewritten and restated to the witness.

The complainant admits that the witness is entitled to understand the question, and it is the duty of the commissioner to explain it to the witness, instead of counsel for the defendant in these cases, and only has the same rights he would be en'tled to if the witness was being examined in open court.)

Int. 41. Where do you dress off the rail in all cases where the patch is less than nine feet from the end of the rail?

A. Dress it on top of the machine.

Int. 42. Does or not the vise, with three-sixteenths or one-fourth of an inch removed from underneath the rail, give you the necessary support in dressing of a center patch when it is more than nine feet from the end?

A. It does.

Int. 43. But when two inches or more is removed are you not obliged to find a support outside of the machine, which you called false support, for this purpose?

A. We are obliged.

Int. 44. Do you, or not, use this false support for any other purpose than for dressing up the side of the rail when the patch is put on more than nine feet from the end?

A. We use it in straightening the rail; we use it for a bearing while straightening the rail.

Int. 45. When there is only three-sixteenths of an inch removed from the anvil so as to give no bottom support to the rail while patching, will or not the anvil, in this condition, answer to the purpose of straightening and dressing up the sides when the patch is over nine feet from the end of the rail?

A. It will.

(The complainant objects to each and every of the foregoing interrogatories, and to the several answers thereto, in regard to the use, or opinions in the use, of the machine with the bottom out, as incompetent and irrelevant to any matters in issue in each of the foregoing cases.)

847 Cross-examination:

Y Int. 1. You state you are repairing rails by contract. Please state the nature of that contract.

A. I have a certain sum by the piece for repairing rails. There is no difference in my contract, whether I put three patches on a rail or not any.

Y Int. 2. What do you get apiece, and what are you required to furnish in repairing of rails?

A. I get forty-six cents apiece; nothing but the labor.

X Int. 3. Has that been your contract for the last eleven years that you have been to work for the company?

A. No, sir; I have had three different contracts.

X Int. 4. Please state the substance, as near as you can, of the nature of each of the different contracts, and what the company required of you in these contracts.

A. It is nothing different only in the price; the price has been different, that's all; the first was 32 cents, the second was 40 cents, and the third was 46 cents. The company required that I should put on two patches on to a rail and a weld, and that was the extent.

X Int. 5. Were you to furnish anything besides the labor, and how much were your two patches and weld to consist of in *a* inches for these repairs?

A. Not anything but labor; there was nothing said about it.

X Int. 6. Then if a rail required patching two feet in one place and six inches or one foot in another, were you obliged by the contracts to put that amount on?

A. No, sir; I was not.

X Int. 7. How much were you obliged to put on?

A. I was obliged to put on just what I saw proper.

X Int. 8. Was it left entirely to your own discretion as to how much you were to patch a rail?

A. There was nothing said, only two patches and a weld.

X Int. 9. What do you mean by two patches and a weld?

848 A. A patch is what I can put on in one heat; two patches what I can put on in two heats; a weld is a weld, whether I can do it in one heat or two, all being in the same place.

X Int. 10. Then a weld might be from six inches to three feet, might it not?

A. It couldn't be over sixteen inches.

X Int. 11. How much patching have you put on at one heat in inches?

A. I think sixteen inches is the extent.

X Int. 12. Do rails require more or less patching on the ends or between the ends?

A. They require more on the ends.

X Int. 13. How much more?

A. I'll have to guess at it. I should think about 75 per cent. more on the ends.

X Int. 14. Do you frequently, in repairing rails, patch each end, put a weld on the center or between the two extreme ends?

A. It's often the case.

X Int. 15. How many rails do you and have you averaged to repair per day during the time in which you worked at said business?

A. From 16 to 25.

X Int. 16. What do you pay your helpers per day, each, and how many employed at each fire, and what kind of a fire do you use and how blown?

A. Pay them $1.75 now. I employ three at each fire. I use a furnace blown by fan.

X Int. 17. Do you employ a smith and three helpers at each fire, making four men, or only a smith and two helpers?

A. A smith and two helpers.

X Int. 18. About how much coal or coke do you use at each fire per day, and do you know the cost of the same?

A. We use about seven bushels of coke; don't know the cost.

849 X Int. 19. Do you repair the same kind of rail now as you have during the time in which you have been engaged in repairing during the last eleven years? If not, state fully the difference, the height and configuration of the rails, their length and weight of same per yard.

A. We do not. We use that kind of rail now (referring to rail marked "Cleaveland rail.") The rail we now use is just four inches high. The old pattern rail was not so long in the shank. The ball of the rail was heavier. Didn't use any splices on the old rails. The present lengths is 24s and 28s, principally 24s and 28s. The Cleveland rails weigh 66 pounds to the yard. The old rails varies in height from three and a half to four and a half inches. The old rails were from 18 to 24 feet in length. Can't tell the weight per yard of old rails. Never weighed them.

X Int. 20. What name was given to the kind of old rail spoken of? Was it what was known as the T rail?

A. Yes, sir.

X Int. 21. What was the height of the rail you repaired at the time you worked for Abel Whitcomb?

A. They varied from three and a half to four and a half inches.

X Int. 22. Did you have different machines or different sets of jaws used in the repairing of the different heights of rails?

A. I had different sets of jaws.

X Int. 23. Were the jaws made so as to fit the different patterns of the rails to be repaired, coming up to about the center of the crown or tread of the rail to be repaired?

A. Yes, sir; they were.

X Int. 24. When did you hear first that there was any controversy with regard to the machine used in repairing railroad-rails, and from whom?

A. On the 15th day of December last. I think his name was P. O. Gassett.

850 X Int. 25. What did he say in regard to this controversy?

A. He said some party claimed a patent on the bottom support in the machine.

X Int. 26. What did he say to you in regard to it?

A. He said he wanted I should put in the machine that he had fitted over. I think that was all. He said he wanted I should put in the machine that he had fitted over, and send another to have it fitted over, and continue to do so until we had got them all fitted over.

X Int. 27. What did Mr. Gassett state his reasons or objections were to have these machines changed or fitted over, and what is Mr. Gassett's position on the road?

A. His reasons were that a party claimed a patent on the bottom support by taking out the bottom support. He reckoned the machine would be just as good to have the bottom support taken out as to have it in. He made the remark that we hadn't used the bottom support in some, but he thought that he would take it out more than it was. Mr. Gassett is foreman of the machine-shops in Cleveland—the Cleveland & Erie shops.

X Int. 28. How many fires do you use at your place in repairing rails, and do you know of them being used on the Cleveland & Erie Railroad for that purpose?

A. Only two; six, I think, are all.

X Int. 29. How many have been used at one time since you have been to work during the past eleven years on the Cleveland & Erie Railroad, and at what places?

A. Six is the most that I have known to be used at any time, four at Cleveland and two at Kingsville.

X Int. 30. Have you worked steadily at this business of repairing rails during the past eleven years at your place with two fires? If not, state the length of time you haven't been so employed.

A. I have not. The first five years I think I would average
851 half the time. The last five or six years I think I would average three-fourths time.

X Int. 31. Do you keep an account of the number of rails you repair; if yea, how often do you render such an account, and to whom?

A. I do; I render an account monthly to Charles Collins.

X Int. 32. What is Charles Collins' position on the road?

A. Chief engineer.

X Int. 33. How long have you repaired the fish-joint rail on the Cleve-

land & Erie Road, and have they been all of the same height and configuration?

A. I should think we had nine years; we used the wooden splices first; they have not all been of the same height and configuration.

X Int. 34. Did you use different sizes of jaws for repairing different heights of the fish-joint rail?

A. Yes, sir; we do.

X Int. 35. Is that or not a more difficult rail to repair than the old-fashioned rail known as the T-rail? If yea, state the reasons why.

A. It is not.

X Int. 36. Why not? Is not the neck of the fish-joint rail thinner and higher as between the flange and ball than the old-fashioned T-rail, and more difficult to keep the neck in its proper place?

A. First the reason why it isn't more difficult to repair because the jaws keep both the ball and its shank to its proper place; it is thinner and higher, but not more difficult to keep the neck in its proper place.

X Int. 37. Do you ever have any trouble with the fish-joint rail by it splitting in the neck by the process of patching while repairing it?

A. We have with one kind, and that's called Johnstown rail.

X Int. 38. What causes it to split?

852 A. Overheating, and the iron is poor.

X Int. 39. Did Mr. Gassett send for you to come to Cleveland in December, or did he go to Kingsville to see you, about taking the bottom out of this machine for the purpose of trying it in that way?

A. No, sir; he did not go to Kingsville to see me about taking the bottom out.

X Int. 40. Where were you at the time you had this conversation with Mr. Gassett in December; this conversation that occurred which you have testified to about the bottom being taken out?

A. It was in Water street, Cleveland.

X Int. 41. Did you know at the time you were in Cleveland and had this conversation with Mr. Gassett on Water street that the Cleveland & Erie Road had been sued for using this machine in repairing their rails?

A. No, sir; I did not.

X Int. 42. Have you been in the habit, when a rail required cutting off, to cut it off in the machine heretofore?

A. When they cut off but a short piece, I have; when they cut off about seven feet, I should think.

X Int. 43. Why didn't you do it when the rail wanted cutting off a longer piece than that?

A. The furnace was in the way.

X Int. 44. Do you cut off rails in the machine since you have changed it as represented by the Cleveland vise?

A. No, sir; we do not.

X Int. 45. Why not?

A. It makes a burr on the flange; have to take extra time to cut off the burr that it made on the bottom.

X Int. 46. Did you ever try to cut off a rail since the machine has been changed to represent what you call the "Cleveland vise" in that machine?

A. Very few.

853 X Int. 47. Did it split the necks or tear the flange from the neck of the rail while you were cutting it?

A. It did not have that effect in what we cut.

X Int. 48. By what name has the machine which you have used in repairing railroad-rails been known among railroad-patchers?

A. I haven't known it by any particular name; sometimes called it anvil, sometimes swedge-block, and other times machine; the only names I have known it by.

X Int. 49. Did you never hear it called the "Whitcomb machine," and didn't Whitcomb claim to be the inventor of it during the time you worked for him?

A. I never heard it called the Whitcomb machine; Whitcomb claimed an improvement on it; he never told me what that improvement was; I supposed it was this lever purchase, (referring to "Cleveland vise.")

X Int. 50. Is that model marked "Cleveland vise" a correct representation as to all its parts, as the machine which you say was changed and used by you for repairing rails for thirteen days in December, 1869? If so, state the difference between the machine as used and the model.

A. It is.

X Int. 51. Isn't there attached to the frame on which the machine rests strips of iron on each side of the frame, and coming up, just outside of the machine, a roller-bar of iron across the back part of the machine for the purpose of supporting the rail?

A. Yes, sir; there is.

X Int. 52. Is that roll attached for the purpose of supporting the rail at the end of the machine the farther*est* from the forge?

A. It is the farther*est* from the forge.

X Int. 53. Why is the roll so attached? What is its object?

854 A. It makes it easier to get the rail out of the furnace; it also helps to hold the rail up to its place till we put down the lever.

X Int. 54. Describe, as near as you can, what you have on the front end of the machine next the furnace, and its object.

A. We have cast-iron block 12 by 14 inches; its object is to dress off the edges of the rail when center patches are put on; we also cut off the rail on it.

X Int. 55. How high up on the machine does the top of the anvil come when placed end for end against the machine?

A. It comes up as high as the dove-tail upon which the movable jaws slide, (referring to Cleveland vise.)

X Int. 56. Is that dove-tail slide on which the jaws slides, which you referred to in your last answer, as represented in the Cleveland vise, higher or lower than the anvil was in that machine before the bottom was taken out?

A. It was just the same height.

X Int. 57. Thus, as you have been using this machine, you have a support at each end of the machine for the rail to rest upon, as represented by the model marked "Cleveland vise?"

A. The roller we have there to rest the rail on until we put the lever down, and the anvil on the other end of the machine we have for the purpose of cutting off rails when they don't require but five or six feet cut off; and to dress off the edges of the rails when they are patched more than nine feet from the ends, we have those supports there, but when the lever is down the rai' don't have any support from the roller or anvil.

X Int. 58. After patching the end of the rail in the machine as marked "Cleveland vise," do you or not, in taking it out of the jaws, place it upside down on the top of them and strike with a sledge on the flange of the rail with the ball on the anvil?

A. We do not strike the rail with a sledge, but put a flatter on the

end and strike the flatter with a sledge; this is done on all the machines I ever worked on; we do turn the rail upside down in taking it out of the jaws.

855 X Int. 59. Why do you do that; why do you place the flatter on the flange and strike that with a sledge, the ball or head resting on the anvil at the time?

A. To prevent marring the rail with the sledge; also, when striking with a sledge, we do not always strike the flange which binds it down and puts it out of shape, and by striking on the flatter we obviate that.

X Int. 60. Why do you have to put the flatter on the flange of the rail and strike it after the patch has been welded on the ball or crown of the rail?

A. To straighten the rail.

X Int. 61. How to straighten the rail; does it become wider in the neck while patching it, as represented by the model marked "Cleveland vise?"

A. In drawing the ball of the rail it binds or crooks the shank of the rail; it crooks the shank and flange; I think it does become a trifle wider in the neck of the rail while patching.

X Int. 62. Then, after you get through this operation, which you have just stated, don't you turn the rail back, placing the flange of the rail on the anvil, and take a flatter and strike on each side of the flange of the rail, for the purpose of straightening it and making it perfectly level?

A. We do on all machines.

X Int. 63. If you discard the jaws of the machine, and have nothing but a bottom support for the rail to rest on, what would be the effect on the rail in repairing it?

A. It would close up the ball and the flange of the rail together.

X Int. 64. Would it make the rail worthless or not?

A. It would make it worthless for use.

X Int. 65. Do all rails require the same amount of patching, as to thickness of patch and length to be patched?

A. They do not; some require one-half inch more, some five-eighths, and some three-quarters.

X Int. 66. Do you ever repair rails when the entire ball is nearly gone?

856 A. We do, when they are nearly gone.

X Int. 67. Did you, while patching rail those thirteen days you speak of, in December, with this machine as represented by this model of "Cleveland vise," have to repunch the holes in the rails to receive the bolts of the fish-plates after they have been patched?

A. We drove through a punch to open out the holes.

X Int. 68. Why did you have to do this?

A. It closed up the hole, and made it smaller than it was before we commenced patching it.

X Int. 69. How could it close up the hole, there being no bottom support to the rails?

A. I think the jaws, by pressing up against the sides of the shank of the rail, holding the shank from below the hole, (referring to hole in Cleveland rails,) has a tendency to close the hole when we put on a patch, or at least it does close.

X Int. 70. Does the rail drive down between the jaws in the soft heated state to which you have to bring the rail for the purpose of getting a welding-heat while patching it, and hammering on the ball of the

rail with sledges, on the machine which you use, as represented by the model marked "Cleveland vise?"

A. It does not.

X Int. 71. How is it when the hole becomes closed while you are patching it in this machine?

A. As I said before, it does draw the shank a trifle at the very end; most at the end, or near the place. I don't know as I can thoroughly explain that, but it does close the hole some.

X Int. 72. You say you are a practical blacksmith, and have worked at the business of repairing rails about twelve or thirteen years; now I wish you to explain, if possible, how the shank of the rail can be drawn and become narrowed, as I understand your last answer, when it is patched on the machine, without any bottom support, as represented in the model marked "Cleveland vise."

857 A. I call it longer when it's stretched between the ball and the flange; taking out the bottom support of the machine, the bearing comes on the ball of the rail, on the jaws wholly, and there being no bottom support, consequently, by heavy pounding or hammering, it jams up the bottom of the ball; so, consequently, all that it jams up the bottom of the ball makes the shank so much longer.

X Int. 73. Please describe the machine as near as you can that you've used for the last eleven years repairing rails as to weight, length of jaws, and how operated, and how the jaws are attached to the machine.

A. The weight I shall have to guess at. I never figured the solid inches on the machine, and consequently can't tell what the weight would be. It weighs somewhere from sixteen to twenty hundred pounds. The length of the jaws, two feet; the stationary jaw is put on a dove-tail pinned; the side jaw works on a dove-tail by the means of a lever; the jaws are worked by a lever, (see "Cleveland vise;") they are worked by an eccentric and cogs on a rack; the jaws are moved by a cogged lever on a cogged rack or slide. When the lever is drawn, it closes up the jaws to the bar or rail; when it stands perpendicular, the jaws are open or thrown apart.

X Int. 74. Are the jaws attached to the face of the anvil of the machine fastened down with bolts through the frame or bottom anvil?

A. The stationary jaw is attached to the face of the anvil of the machine; it is fastened to the frame.

X Int. 75. How large in diameter is the roll on the back part of the machine that you have substituted since cutting the bottom of the anvil out two inches, as you have testified you have used the machine thirteen days in December?

A. About four inches.

X Int. 76. Is there anything represented in this model marked "Cleveland vise" showing the roll as used in the actual machine after the bottom is cut out two inches—the anvil which you call a false anvil

858 attached to the other end of the machine—as used by you while repairing rails thirteen days in December?

A. No, sir; there is not.

(Complainant objects to the use of this model in connection with the evidence as not showing fully the mechanism used while the work was purported to be done, and not fully representing the machine which the witness has testified he has used.

Defendant rejoins that the roll and anvil referred to is no part of the matter at issue.)

Redirect examination:

Int. 46. How many sizes of rails could be repaired in Cleveland vise as constructed by Abel Whitcomb?

A. There could only one height be repaired if the shanks were the same height.

Int. 47. How many different heights of rails could be repaired at the same vise after it was altered by planing out 3-16 or $\frac{1}{4}$ of an inch off the anvil underneath the rail?

A. We had but two different heights that we could repair in it.

Int. 48. Why could you repair two different heights in the vise after it was altered and only one before it was altered?

A. Before it was altered the jaws and anvil both filled the rail. After it was altered, the jaws being made $\frac{1}{4}$ of an inch higher to give the low rail $\frac{1}{4}$ of an inch play from the top of the anvil, consequently it gave room to repair two heights of rails.

Int. 49. Was the making the jaws $\frac{1}{4}$ of an inch higher the same as planing out a $\frac{1}{4}$ of an inch off the anvil, the jaws remaining unchanged?

A. It was the same.

Int. 50. Since there has been planed out two inches of the anvil underneath the rail, how many different heights can you repair in said "Cleveland vise," the jaws being adapted to the neck of the shortest iron?

859 A. We can repair all the different heights that we have on the road.

Int. 51. How many different heights of iron are there on the road?

A. There is four different heights of the splice-rail.

Int. 52. Please explain why you can repair the four different heights on the same jaws in "Cleveland vise."

A. The jaws being fitted to the lowest rail will receive any height there is. The anvil being planed off two inches will let the rail drop down sufficient for the ball of the rail to rest on the vise or jaws, and there not being no bottom support, we can patch a rail without affecting the shank.

Int. 53. What is the height of the lowest fish-plate iron, and also the highest?

A. The lowest now in use is about $3\frac{7}{8}$ inches, and the highest $4\frac{1}{2}$ inches.

Int. 54. What office does the roll attached to the rear end of the block perform?

A. It makes it easier to get the rail into the machine; also it holds the rail until the jaws take the rail and support it.

Int. 55. Is it a common matter, in all cases where the furnace and the vise are set in line, to have a roller on one or both ends of the vice, or near it, for the purpose of passing the rail in and out of the furnace?

A. It is a common practice to have a roller at one end or near the machine?

Int. 56. And is this the case whether the bottom of the anvil is planed out or not?

A. Yes, sir.

Int. 57. What office does the anvil placed in front of the vise perform?

A. Dressing off edges of centers, cutting off rails when it isn't necessary to cut off more than five feet; also for straightening rails
860 when patched more than nine feet from the end. We use it some-

times for welding up rails, when they are cracked in the ball, before fitting it for a patch.

Int. 58. Would the roll at the rear end of the vise perform the same office if it was detached from the machine and made to stand upon its iron bottom?

A. It would.

Int. 59. Does or not the anvil in front of the vise and the roll in the rear perform any office whatever while the rail is being patched in the jaws?

A. It does not.

Int. 60. You say that the neck or shank of the rail is lengthened a trifle in patching without support to the bottom of the rail. Is such lengthening of advantage or disadvantage in receiving the splice-plates?

A. It is an advantage.

Int. 61. Does the same advantage appear when a rail is patched in the vise which gives support to the bottom of the rail? If not, why not?

A. It does not. The reason is that, when the anvil and jaws both fit the rail when cold, come to heat the rail it expands it, which, when having bottom support, the ball of the rail would not rest on the jaws of the vise. When we come to put a patch on, the rail would hammer the ball of the rail down to fit the jaws; then, when it cools off, the rail contracts in the shank so as not to receive the splice properly.

Int. 62. How many years have you repaired railroad-rails in a vise that gave no support to the bottom of the rail in patching?

A. I have repaired rail for nine years in a vise that gave no bottom support to one height.

Int. 63. How long have you repaired rails in a vise that gives no bottom support to a rail of any pattern?

A. Since the 16th of December, 1869.

861 Int. 64. Is the vise now used by you correctly represented in model marked "Cleveland vise;" and is the rail marked "Cleveland rail" one of the patterns of rail now repaired by you?

A. With the exceptions of this roller attached to rear of machine, it is; the rail marked "Cleveland rail" is one of the patterns of rails now repaired by me.

Int. 65. Do you expect to continue the use of the vise so long as you repair rails for said company under your existing contract?

A. I do.

Int. 66. Is the use of such vise a mere experiment to ascertain whether rails can be patched properly and successfully in a vise that gives no bottom support to the rail?

A. I think it was all experiment when it was first fetched over to give the rails one-fourth of an inch play from the anvil.

Int. 67. What was the result of that experiment?

A. It is an advantage.

Int. 68. Do you consider the vise, as now used by you, an experiment to see whether you can obtain an advantage?

A. Not being the originator, I could not tell what the originator's objects were.

Int. 69. Is the operation of patching rails in the vise, as you now use it, successful or unsuccessful?

A. Successful.

Int. 70. You say that the hole in the rail as seen in Cleveland rail model, for the purpose of receiving the bolts to hold the fish-plates, is

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Int. 63. How long have you repaired rails in a vise that gives no bottom support to a rail of any pattern?

A. Since the 16th of December, 1869.

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A. With the exceptions of this roller attached to rear of machine, it is; the rail marked "Cleveland rail" is one of the patterns of rails now repaired by me.

Int. 65. Do you expect to continue the use of the vise so long as you repair rails for said company under your existing contract?

A. I do.

Int. 66. Is the use of such vise a mere experiment to ascertain whether rails can be patched properly and successfully in a vise that gives no bottom support to the rail?

A. I think it was all experiment when it was first fetched over to give the rails one-fourth of an inch play from the anvil.

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Int. 68. Do you consider the vise, as now used by you, an experiment to see whether you can obtain an advantage?

A. Not being the originator, I could not tell what the originator's objects were.

Int. 69. Is the operation of patching rails in the vise, as you now use it, successful or unsuccessful?

A. Successful.

Int. 70. You say that the hole in the rail as seen in Cleveland rail model, for the purpose of receiving the bolts to hold the fish-plates, is

slightly closed while the patch is being put upon the ball. Please explain whether said hole is closed as much or more when the rail has a support under the bottom.

A. It is closed more when we have a support under the bottom.

Int. 71. From your knowledge and experience in patching rails, what value, if any, is there in a vise that gives a support to the bottom of the rail compared with one that gives no support while the rail is being patched?

862 A. There is no advantage in patching ends to have a bottom support; patching centers, when we have no bottom support in patching the rail, the ball settles on the bottom, and hammering on the center patch drives the rail down between the jaws of the vise and makes the bottom of the rail bowing, more so than when it has a bottom support.

Int. 72. In such case what do you do after the patch has been welded on the center, as above described?

A. We turn it bottom side up, put on a flatter, and have them strike it with a sledge to straighten it.

Int. 73. Did you have to do this when you patched rails in the vise planed out three-sixteenths or one-fourth of an inch?

A. Frequently we did, but not so much.

Int. 74. Which do you prefer, a vise like the Whitcomb vise, which gave support to the bottom of the rail, or the vise that gives no support?

A. The Cleveland vise does the work the best on the ends, but the other in the center; it's the most work to do on the center. I did not mean that the other did the work the best on the center, but it took the most time to do the same amount of work. I don't think my experience is enough to decide which I prefer.

Int. 75. Do you do the same amount of work per day or week in the Cleveland vise as on the Whitcomb vise?

A. I do.

Int. 76. Do you expect to continue to do as much work per day?

A. I know nothing now why I wouldn't be able to.

Int. 77. Is the work done equally as well on Cleveland vise as on Whitcomb vise?

A. I think a little better on Cleveland vise.

Int. 78. Then it comes to this, does it, that there is a little inconvenience in putting on patches in the center of the rail, for the reason that the rail is slightly bowed, which did not occur in the Whitcomb vise?

A. Yes, sir.

863 Int. 76. How do you now remedy this bow in the rail so as to make it fit to lie in the track?

A. We straighten it.

(The complainant objects to each and every of the foregoing interrogatories and to the several answers thereto in regard to the use, or opinions in the use, of the machine with the bottom out, as incompetent and irrelevant to any matters in issue in each of the foregoing cases.)

Recross-examination:

X Int. 77. Did any of the machines which you used prior to the 16th day of December, 1869, have any rolls attached to the machine, and how far from the machine were the rolls or support that you speak of?

A. They did not have any rolls; the rolls or support I speak of were three feet from the machine.

X Int. 78. Have you ever measured the amount of work per week or day, in feet or inches, at any time since you have been repairing rails in any way?

A. I have never measured for one day, but I have kept an account of the amount of patch-iron we have used in two months; I think I have that account now.

X Int. 79. Did you measure the work, in feet or inches, that you have done while working on the machine after the bottom was taken out, since the 16th of December, 1869?

A. I did not.

X Int. 80. How, then, do you know you done as much work in patching, in feet or inches, as you did before the bottom was taken out?

A. I don't know the amount in feet or inches; all I know, I compared the work done the sixteen days December last with the amount of work done in sixteen days in December, 1868; also, the work done the last five days of December, 1869, with the same amount of work done
864 the last five days of December, 1868, which amounted to more than the work done a year ago, in bars.

X Int. 81. What led you to make this comparison you refer to, and did any one wish you to make it; if so, whom?

A. I did it for my own individual interest; no one wished me to make it.

X Int. 82. As you have stated that all rails did not require the same amount of patching, some wanting one patch, some two patches and a weld, how do you arrive at the amounts done during the time which you refer to in your foregoing answer, and state that you did as much during each time, as long as you kept no account, in feet or inches, of the amount of work done?

A. We have a uniform rule that we work by; every rail not needing more than three patches we patch, and in different months of the year require a percentage more patching than they do in other months; what led me to compare work done in the sixteen days of December, 1869, also the last five days of December, 1869, with the amount of work done, or the amount of rails repaired, during the same time in 1868, was that I wanted to know whether we averaged as much work, or as many bars, per day with the Cleveland vise as we had with the Witcomb vise.

X Int. 83. Do you know how many feet or inches that you patched during the sixteen days in December, 1869, and the sixteen days in December, 1868; if so, how many during each time?

A. I do not know how many feet or inches.

X Int. 84. Did you put on an equal amount in patching in feet and inches to the same number of rails in December, 1869, that you did in December, 1868?

A. I think equally as many.

X Int. 85. Did the rails repaired at these two different periods, or at either period, require each the same amount of patching?

865 A. I can't tell anything about it.

X Int. 86. Then all you know is that you turned out as many rails in December, 1869, in sixteen days as you did in December, 1868, in sixteen days, but don't know how much you did patch then, in feet or inches?

A. That is all I know about it; I don't know how many patches I did put on, in feet or inches.

X Int. 87. How many rails did you turn out in the sixteen days in December, 1869?

A. I don't know, for I haven't the account with me, but I know it to be as many rails repaired in the sixteen days in December, 1869, as in the sixteen days in December, 1868.

X Int. 88. About how many rails did you repair during each of these periods, to the best of your knowledge and recollection?

A. Ab'ut three hundred and thirty in sixteen days in December, 1869, and about three hundred and thirteen in sixteen days in December, 1868.

Redirect examination:

Int. 80. You have stated that you worked by contract, and that you have, under said contract, forty-six cents for each rail repaired and turned out of the shop. Now, was it or not your object in comparing the work of sixteen days in 1868, with the work for the same time in 1869, to ascertain whether you were receiving as much money from the company in repairing rails in the Cleveland vise as you were receiving for the same work in the same vise before the bottom was removed, as seen in Cleveland vise?

A. Yes, sir; it was my object.

Int. 81. Then it does not matter to you how many inches you put on a rail, inasmuch as you are governed under your contract by the number of rails, and not by the amount put upon each rail?

A. No, sir; it does not matter to me how many inches I put upon a rail; the less the better.

866 Int. 82. Are you governed wholly by the number of rails put out in determining whether it's for your interest to use the Cleveland vise or the one used by you before the alteration was made?

A. I am with my present experience.

Int. 83. Is it or not your experience that you turn out as many or more rails per day at the present time, compared to any time previous to December 16, 1869?

A. I turn out as many now as at any time previous to December 16, 1869.

Recross-examination:

X Int. 89. Does the Cleveland & Erie Railroad Company furnish you with the machine for patching or mending rails? If so, are you obliged to use any kind of machine that they see fit to furnish you under your contract while you are repairing rails?

A. They do, I think. I am not obliged to use any machine they see fit to furnish me under my contract while repairing rails.

(Signed) WM. CULLON.

WILLIAM BENEDICT, of lawful age, being first duly cautioned and sworn, deposes and says as follows, to wit:

Int. 1. What is your name, age, residence, and occupation; how long have you been so employed, and for whom?

A. My name is William Benedict; I am 37 years of age; reside at Norwalk, Huron County, Ohio. I am a blacksmith; I have been engaged in the occupation of blacksmith about twenty-two years; seven years of that time for different persons, whose names I have forgotten, and fifteen years for the Cleveland & Toledo, Cleveland & Erie, Lake Shore & Michigan Southern Railroad Companies.

867 Int. 2. What position do you occupy at the present time?

A. I have charge of the blacksmith department of the Toledo division.

Int. 3. Do you repair rails at Norwalk; if so, do such repairs come under your supervision?

A. I do repair rails at Norwalk, and such repairs come under my supervision.

Int. 4. Look at the model marked "Cleveland vise," and state what it represents.

A. It represents a rail-block used for repairing rails.

Int. 5. Is such a block in use at Norwalk for that purpose?

A. It is.

Int. 6. What alteration has been made, if any, in such a block during the past three or four months?

A. It has been planed out. A crease has been planed out of it the same as this, (referring to the model marked "Cleveland vise.")

Int. 7. About how deep and how wide is the crease?

A. About two by four and one-half inches.

Int. 8. What was the condition of the block, or that part of it directly under the rail, before the crease was planed out?

A. It was lined across level with this, (referring to dove-tail in model marked "Cleveland vise.")

Int. 9. Have no blocks, have you, in use at Norwalk, like Cleveland vise; and are you repairing rails daily on said block or blocks; and have you compared the work done on the same for the last two months with work done on the same block in which a support was given to the bottom of the rail while in the jaws for patching?

A. We have two blocks in use at Norwalk like the Cleveland vise. We are repairing rails daily on said blocks. I have compared the work done on the same for the last two months with work done on the same block in which a support was given to the bottom of the rail while in the jaws for patching.

868 Int. 10. Please state the result of the comparison; the time and manner of making the same.

A. I see no difference in the amount or quality of work done. I think we have used the Cleveland vise two or three months. I have not compared the work all of the time, but I have part of the time.

Int. 11. Have you, by referring to work done for two or more months before the alteration, ascertained the amount of rails patched, and compared it with the amount of rails patched in the vise since the alteration; if so, what result?

A. I have ascertained the amount of rails patched for part of the time. I have not ascertained the amount of rails patched during the whole of two months; and I have compared the amount of rails patched since the alteration of the machine with the amount of rails patched before the alteration of the machine for part of the two months mentioned. I see no difference in the number or quality of rails repaired.

Int. 12. Any anvil or block in front of the vise, as used at your shop, or any roller attached to the rear end of the frame of the vise?

A. There is no anvil or block in front of the vise as used at our shop, and there is no roller attached to the rear end of the frame of the vise.

Int. 13. Is there no roller or rollers at any place; if so, where are they and what office do they perform?

A. There is two rollers—one between the fire and the block and one back of the block. The one between the anvil and the fire is to take the rail out of the fire to the block. The one back of the block is to keep the rail from dropping down into this notch (referring to the model marked "Cleveland model") while taking the rail from the fire to the block.

Int. 14. Does the rail rest on the back roller when the rail is clamped in the jaws of the vise?

A. It does not rest on the back roller when clamped in the jaws of the vise.

869 Int. 15. Were these rollers in use before the alteration was made in the jaws of the vise?

A. One of them was used; the other was not.

Int. 16. How many different heights of rail can you repair in the jaws of the vise since the alteration?

A. I can repair three heights of rails.

Int. 17. Could you do this on the same jaws before the alteration?

A. I could.

Int. 18. Without change of jaws?

A. Yes, sir.

Int. 19. What is the height of the lowest iron used on your road and which you repair in the present vise?

A. I think it is 3⅞ inches.

Int. 20. What is the highest?

A. Four inches and an eighth.

Int. 21. If your jaws were adapted to the lowest iron before the bottom was planed out, how could you repair the highest iron in the same jaws and not upset the neck, the bottom being supported from beneath?

A. I could not.

Int. 22. Please explain how you reconcile your answer to the 17th interrogatory with your answer to the 21st?

A. The blocks were fitted to the highest iron, consequently we could mend the lowest.

Int. 23. Could you do this alike in both cases, before and after the alteration?

A. I could.

Int. 24. Do you cut off the patch after it is welded on the rail in the jaws?

A. We do.

Int. 25. For all purposes of dressing up the sides of the rail after the patch is put on and straightening the rail, what part of the vise do you use?

870 A. We use the top part.

Int. 26. What is your method in cutting off rails?

A. (Witness puts Cleveland rail in jaws of Cleveland vise.) I can cut through the ball while in the jaws and put it on top of the block and cut the balance off.

(The complainant objects to each and every of the foregoing interrogatories, and to the several answers thereto in regard to the use, or opinions in the use, of the machine with the bottom out, as incompetent and irrelevant to any matters in issue in each of the foregoing cases.)

Cross-examination:

X Int. 1. Did you ever repair railroad-rails yourself, and are you repairing them at the present time?

A. I never did repair them myself, and am not repairing them at the present time.

X Int. 2. Is there any account kept of the number of rails, and of the feet and inches of the repairs on the same; and, if so, by whom kept, and to who is it returned, and how often?

A. There is an account kept of the number of rails, and of the feet and inches of the repairs on the same. The account is kept by the man that repairs the rails. The account is returned to me once a week.

X Int. 3. To whom do you return it, and how often?

A. I return it to Charles Collins once a week.

X Int. 4. Who is Charles Collins, and what is his position on the road?

A. He is chief-engineer.

X Int. 5. Of what part of the road is he chief-engineer?

A. From Toledo to Buffalo, I think.

X Int. 6. Does the repairing of the rails come under his special department connected with the road, and for how long have you returned these accounts of rail repairs to him?

871 A. I think the repairing of the rails comes under his special department connected with the road; I have returned these accounts of rail-repairs to him about eleven months.

X Int. 7. To whom did you return them before that, during the time that you have been employed in Norwalk?

A. That is all the length of time I had charge of the rails.

X Int. 8. Who had charge of them before that time?

A. John H. Palmer had charge of them.

X Int. 9. What was John H. Palmer's position on the road or for the company?

A. He had charge of the blacksmith department.

X Int. 10. Were the accounts of rail-repairing returned to him, and do you know to whom he returned such accounts?

A. They were returned to him; he returned them to the chief-engineer's office. Mr. Williams was chief-engineer part of the time, and Mr. Collins part of the time.

X Int. 11. Is the rail-repairing carried on in the same building that the other blacksmith work is, or in a separate building and department where the blacksmith work is done?

A. It is carried on in the same building where a part of the other blacksmithing is done; we have two blacksmith-shops, a door between the two, but they are separate buildings.

X Int. 12. Are you what is termed the master mechanic of all the blacksmithing and machinery business carried on at Norwalk?

A. I am not.

X Int. 13. Which shop have you charge of?

A. I have charge of the blacksmith shops at Norwalk, Elmore, and Elyria.

X Int. 14. How many more machines are and have been made during your connection with the road in repairing rails, and what name did you give machines prior to the time of the bottom being cut out two inches?

872 A. There have been seven machines used during my connection with the road; there are five in use now; we called the machine "Rail-block" prior to the bottom being cut out.

X Int. 15. Did you have different sets of jaws which you used in repairing the different heights of rails; if so, how were they fastened and detached from the machine?

A. We had but one set of jaws for each block for repairing fish-plate rails; we had another set of jaws to fit the same block for repairing T-irons, (referring to the Cleveland vise,) the stationary slipped on over the dove-tail, two pins through it to hold it on; the movable jaw detached from the rack slipped back off from the dove-tail and came out; the movable jaw is fastened to the rack by two bolts, and to the block by the dove-tail.

X Int. 16. You say you kept an account, and made a comparison within the last two months as to the amount of work done on a machine like the model marked "Cleveland vise," and on the machine before the bottom was taken out; what were the amounts of work done per day or week, in feet or inches, on rails repaired daily by each method?

A. About 18 rails per day; the number of feet or inches I cannot tell; not having brought the account with me, I do not remember.

X Int. 17. How much patching do you do to the rails in feet or inches?

A. From one inch to twenty-four.

X Int. 18. Do you know, of your own knowledge, that there was much done in patching during the time which you compared it with the bottom and of the machine as there was before, in feet and inches?

A. I think I do.

X Int. 19. Did you measure the amount of patching done on the rails or take the measurement given you by the smith of each fire?

873 A. Some of it I measured myself; some of it I got from the smith that mended the rails.

X Int. 20. Did you measure the patching done on the machine at the time you made the comparison before the bottom was taken out of the machine at the time work was done, compared with the amount done on the machine after the bottom was taken out?

A. I did this to see that my men didn't make any false returns of the amount of work done.

X Int. 21. How much did or do your men return as being done daily in feet or inches?

A. I don't remember the amount in feet or inches that they did or do return.

X Int. 22. About how much do they return since you had charge of the shop?

A. I think from ninety to two hundred inches daily. I don't remember exactly.

X Int. 23. How many men did you employ at each fire before the bottom was taken out of the machine and how many since, and the wages of each, kind of fire used and how blown; how much coke or coal used per day at each furnace or forge?

A. I employed three men at each fire before the bottom was taken out of the machine and three since. I pay one man $2.00 per day and two men $1.62½ each. I use a furnace blown by a fan. I think about seven bushels of coke are used at each furnace per day.

X Int. 24. Do you, in any instance, use over three men since the bottom was taken out in repairing rails?

A. I do not.

X Int. 25. What thickness of iron do you use in patching thickness and middle?

A. From one-fourth thick, two inches and one-fourth wide to three-fourths thick and two inches wide.

X Int. 26. What height of rail has been in general use on the road for the past four years?

874 A. From three and seven-eight's to four and one-eight' inches.

X Int. 27. What height of rail is most in use and has been in use for the last four years?

A. I think three and seven-eight's has been most in use.

X Int. 28. Do you know what it is costing the Toledo division per inch or foot to repair their rails?

A. I do not.

X Int. 29. What led you to make the comparisons as to the amount of work done before the bottom was taken out of the machine, and since; did any one request you to make the comparison; if so, who?

A. To see if we mended as many rails now as then; no one requested me to make the comparison.

X Int. 30. Have you heard, and, if so, by whom, that there was any controversy in regard to the machines for repairing the rails?

A. I have heard of such controversy; I heard it about a week or two before New Year's, 1870, by Mr. Gaesett; he came to appear at Cleveland in regard to a controversy about rail-block.

X Int. 31. What did he state to you that controversy was, and who is Mr. Gassett; what position on the road does he occupy?

A. He said it was something about a patent-right. I think he has charge of some of the Cleveland and Erie shops at Cleveland, Ohio.

X Int. 32. Did you get orders from any one to take the bottom out of this machine; if yea, by whom, when, and where?

A. I think Mr. Tier was the first one that said anything to me about the blocks; he told me to send them into the machine shop and he would plane them out. This was some two or three months ago, I cannot tell the exact time, at Norwalk, Ohio.

X Int. 33. Did he state to you any reasons at that time, or any other time, why that was to be done?

875 A. He said it was Mr. Congdon's orders; he gave no reasons other than it was Mr. Congdon's orders.

X Int. 34. What position does Mr. Congdon occupy on the road?

A. He is general master mechanic, Toledo to Buffalo.

X Int. 35. Have you ever had any conversation with him or S. M. Whipple prior to your coming here to give this testimony? If yea, please state it.

A. I have had conversation with Mr. Congdon prior to coming here to give this testimony. He asked me how I got along mending rails since the block was planed out; that is all he asked me. I told him "about the same as before;" that is all the conversation I had with him. I never had any conversation with Mr. Whipple. Don't know that I ever saw him until yesterday morning, (January 6, 1870.)

X Int. 36. Did you know, or have you ever heard, that the Cleveland and Toledo Road, of which that is now called the Toledo Division of the Lake Shore and Michigan Southern Railroad, has been sued for using machines for repairing rails?

A. Don't know that I heard that they had been sued until Mr. Gassett came up there. I heard it talked of in the shop by some one; don't remember who, that they probably would be. I don't know whether Mr. Gassett told me they had been sued or not.

Redirect examination:

Int. 27. How many rail-blocks like Cleveland vise are there now in use on the Toledo division, and are they all planed out as seen in the model?

A. There are five, all planed out.

Int. 28. How many of these are in use at Norwalk?

A. Two.

Int. 29. You say that on comparison of the amount of work done per day in the block before it was planed with the amount per day in

876 the same block since that, the comparison shows an average of 18 rails per day. Do the blocks in use at the other places on the Toledo division show the same average per day?

A. They do at Elyria; at Elyria we have new men running the fires that are not used to rail repairing, therefore I cannot tell.

Int. 30. You say, in your direct examination, that by fitting the jaw to the highest pattern of rail when the machine had a bottom support for the rail, that you could repair on the same machine rails of less

height; would these rails of lesser height while in the jaws for repairs touch the anvil underneath or not?

A. They would not.

Int. 31. Then you had no support to any other pattern than the highest; is that so?

A. It is.

Int. 32. And how long was this the case before the block was planed out, as seen in Cleveland vise?

A. Some six or eight months, to my certain knowledge.

Int. 33. Do you mean by this answer that you found the blocks in this condition you have described when you took charge of rail-repairing at Norwalk?

A. I do.

Recross-examination:

X Int. 37. Do you employ practical blacksmiths in the repairing of rails as foreman of each fire?

A. No, sir.

X Int. 38. If you discard the jaws of the machine and use nothing but a bottom support for the rail while patching it on the ball, what would be the effect on the rail?

A. I do not know; I never tried it.

X Int. 39. As a practical blacksmith, what is your opinion as to the effect?

A. My opinion is that it can be done.

877 X Int. 40. Can the men which you employ repair rails with nothing but a bottom support to the rail, and make it a practical business, and make it advantageous for the railroad companies to so do it?

A. I should think not.

X Int. 46. Did you ever see rails repaired on a common anvil, or swedge-block?

A. I never did.

(Signed) WILLIAM BENEDICT.

ALBERT CONGDON, of lawful age, being first duly cautioned and sworn, deposes and says as follows, to wit:

Int. 1. What is your name, age, residence, and occupation?

A. My name is Albert Congdon; my age is forty-five years; I reside at Cleveland, Ohio, and am the master machinist of the Lake Shore and Michigan Southern Railroad Company.

Int. 2. What was your position before the consolidation of the Cleveland, Painesville and Ashtabula Railroad Company?

Int. 3. How long have you been so employed?

A. I have been acting as master machinist for them ever since April, 1855; in all about fifteen years.

Int. 4. Has the company repaired railroad-rails since that time, If so, please state what knowledge you have had of the matter during that time.

A. They have repaired rails; my knowledge extends from about 1850; before I took charge of repairing, a man by the name of Whitcomb was repairing rails by contract; I observed that the repairing was very poorly done; I noticed that a number of the rails that were ter-

878 minated at the ends were repaired by Mr. Whitcomb without putting on a patch, by simply heating the injured part to a welding heat, and thus hammering it together with hammers, and the usual

tools used in repairing rails, and the consequence was that the end repaired was made one-fourth or three-sixteenths of an inch lower than the rest of the rail; when I took charge of the repairing of rails, I found that the bottom of the rail rested on the anvil (using the dove-tail in Cleveland vise to illustrate) when it was held tightly clamped in the jaws of the vise; the result was that putting the rail on, that was hot and expanded, *and* when patched and hammered, the rail upon becoming cold was lower, just the difference between expansion and contraction; therefore I had the jaws of the machine made higher, so that the bottom of the rail would not rest upon the anvil when held fast between the jaws.

Int. 5. What further alteration, if any, has been made in the machine or vise used at your shop since that time?

A. All the alteration that has been made is that it has been planed out similar to that model, (referring to Cleveland vise.)

Int. 6. Is the model marked "Cleveland vise" a correct representation of the one used by Abel Whitcomb, and afterwards by you, except more of the bottom under the anvil has been removed?

A. It is a correct representation, for all practical purposes.

Int. 7. Has the said machine or vise been in use at your shop since you took charge of the said repairing about 1858, the vise having no support to the bottom of the rail, as you have stated in a previous answer?

A. It has been so in use since I took charge of rail-repairing in 1858.

Int. 8. About what time, as near as you can recollect, was there further alterations made in said Cleveland vise, by removing the metal from underneath the rail as seen in the model before you?

A. I don't know any particular day; I should think about two or three months; I could tell by looking at the books in the shop.

879 Int. 9. Has the machine or vise so altered been in use for repairing railroad rails since the aforesaid alteration was made, and the same in use at the present time?

A. It has been so in use, and is in use at the present time.

Int. 10. Have you examined the amount of work done in said vise for one or two months before the alteration, and compared it with the amount of work done in the same time since; if so, can you give the result of such examination and comparison taken from the record of account kept in your rail-shop?

A. My orders are for the men to keep an account of the work done daily; that report is returned to the office by the foremen, and the clerks report it monthly.

The following is a report given by the clerk, to wit:

Old style:

July, 310 rails, 555 hours	1 245-310
Aug., 188 rails, 375 hours	1 187-188

After altering:

Oct., 417 rails, 702 hours	1 285-417
Nov., 217 rails, 417 hours	1 200-217

(Said report is hereto attached, marked Congdon's exhibit.)

Int. 11. Is said exhibit correct according to the books of the company?

A. I intend it should be correct; I have not compared it; I believe it to be correct.

(The complainant objects to each and every of the foregoing interrogatories, and to the several answers thereto, in regard to the use, or

height; would these rails of lesser height while in the jaws for repairs touch the anvil underneath or not?

A. They would not.

Int. 31. Then you had no support to any other pattern than the highest; is that so?

A. It is.

Int. 32. And how long was this the case before the block was planed out, as seen in Cleveland vise?

A. Some six or eight months, to my certain knowledge.

Int. 33. Do you mean by this answer that you found the blocks in this condition you have described when you took charge of rail-repairing at Norwalk?

A. I do.

Recross-examination:

X Int. 37. Do you employ practical blacksmiths in the repairing of rails as foreman of each fire?

A. No, sir.

X Int. 38. If you discard the jaws of the machine and use nothing but a bottom support for the rail while patching it on the ball, what would be the effect on the rail?

A. I do not know; I never tried it.

X Int. 39. As a practical blacksmith, what is your opinion as to the effect?

A. My opinion is that it can be done.

877 X Int. 40. Can the men which you employ repair rails with nothing but a bottom support to the rail, and make it a practical business, and make it advantageous for the railroad companies to so do it?

A. I should think not.

X Int. 46. Did you ever see rails repaired on a common anvil, or swedge-block?

A. I never did.

(Signed) WILLIAM BENEDICT.

ALBERT CONGDON, of lawful age, being first duly cautioned and sworn, deposes and says as follows, to wit:

Int. 1. What is your name, age, residence, and occupation?

A. My name is Albert Congdon; my age is forty-five years; I reside at Cleveland, Ohio, and am the master machinist of the Lake Shore and Michigan Southern Railroad Company.

Int. 2. What was your position before the consolidation of the Cleveland, Painesville and Ashtabula Railroad Company?

Int. 3. How long have you been so employed?

A. I have been acting as master machinist for them ever since April, 1855; in all about fifteen years.

Int. 4. Has the company repaired railroad-rails since that time, If so, please state what knowledge you have had of the matter during that time.

A. They have repaired rails; my knowledge extends from about 1850; before I took charge of repairing, a man by the name of Whitcomb was repairing rails by contract; I observed that the repairing was very poorly done; I noticed that a number of the rails that were ter-

878 minated at the ends were repaired by Mr. Whitcomb without putting on a patch, by simply heating the injured part to a welding heat, and thus hammering it together with hammers, and the usual

tools used in repairing rails, and the consequence was that the end repaired was made one-fourth or three-sixteenths of an inch lower than the rest of the rail; when I took charge of the repairing of rails, I found that the bottom of the rail rested on the anvil (using the dove-tail in Cleveland vise to illustrate) when it was held tightly clamped in the jaws of the vise; the result was that putting the rail on, that was hot and expanded, *and* when patched and hammered, the rail upon becoming cold was lower, just the difference between expansion and contraction; therefore I had the jaws of the machine made higher, so that the bottom of the rail would not rest upon the anvil when held fast between the jaws.

Int. 5. What further alteration, if any, has been made in the machine or vise used at your shop since that time?

A. All the alteration that has been made is that it has been planed out similar to that model, (referring to Cleveland vise.)

Int. 6. Is the model marked "Cleveland vise" a correct representation of the one used by Abel Whitcomb, and afterwards by you, except more of the bottom under the anvil has been removed?

A. It is a correct representation, for all practical purposes.

Int. 7. Has the said machine or vise been in use at your shop since you took charge of the said repairing about 1858, the vise having no support to the bottom of the rail, as you have stated in a previous answer?

A. It has been so in use since I took charge of rail-repairing in 1858.

Int. 8. About what time, as near as you can recollect, was there further alterations made in said Cleveland vise, by removing the metal from underneath the rail as seen in the model before you?

A. I don't know any particular day; I should think about two or three months; I could tell by looking at the books in the shop.

879 Int. 9. Has the machine or vise so altered been in use for repairing railroad rails since the aforesaid alteration was made, and the same in use at the present time?

A. It has been so in use, and is in use at the present time.

Int. 10. Have you examined the amount of work done in said vise for one or two months before the alteration, and compared it with the amount of work done in the same time since; if so, can you give the result of such examination and comparison taken from the record of account kept in your rail-shop?

A. My orders are for the men to keep an account of the work done daily; that report is returned to the office by the foremen, and the clerks report it monthly.

The following is a report given by the clerk, to wit:

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(Said report is hereto attached, marked Congdon's exhibit.)

Int. 11. Is said exhibit correct according to the books of the company?

A. I intend it should be correct; I have not compared it; I believe it to be correct.

(The complainant objects to each and every of the foregoing interrogatories, and to the several answers thereto, in regard to the use, or

opinion in the use of the machine with the bottom out, as incompetent and irrelevant to any matters in issue in each of the foregoing cases.)

Cross-examination.

X Int. 1. Have you ever repaired railroad-rails for yourself; if so, when, and where, and at what time?

A. I have never repaired railroad-rails myself as a business; I
880 have taken hold and showed green men how I wanted it done; I have not had to take hold of the tools myself for six or seven years.

X Int. 2. Do you have charge of the rail repair shops, or some other party, as foreman?

A. I have general charge and have a foreman.

X Int. 3. How often are you in that shop where they repair railroad-rails?

A. Well, I am in there as often as I think it necessary to go, sometimes once or twice a week, and sometimes it will be several weeks that I will not go into the shop at all.

X Int. 4. Who first gave you the idea or talked with you about cutting the machine as represented by model marked Cleveland vise?

A. I think it was this way, that in my absence my foreman, Mr. Gassett, told me that during my absence there had been a man there talking to him about making a change in the vise or block; this was after I had returned home; afterward Mr. Devedeaux told me to make the change, according to Mr. Whipple's directions.

X Int. 5. Is that Mr. Whipple you refer to in your last answer the Mr. Whipple now present appe'ring as counsel for the railroad companies?

A. I don't know, but I suppose it is; I have no doubt about the man.

X Int. 6. What is Mr. Devedeaux's position as employed by the company of the Cleveland and Erie Railroad, or the consolidations of the Lake Shore & Michigan Southern Railroad.

A. He is vice-presdent of the Lake Shore & Michigan Southern Railway Company.

X Int. 7. What railroad companies make this consolidation of the Lake Shore & Michigan Southern Railway Companies and what were the names of the companies before the consolidation was made?

881 A. As far as I understand, the Buffalo & Erie Railway Company, the Lake Shore Railway Company, the Michigan Southern & Northern Indiana Company, and there may be more companies.

X Int. 8. Who is the president of this consolidation?

A. E. B. Phillips, I understand.

X Int. 9. What did Mr. Gassett say to you on your return home, which you have spoken of, were the reasons assigned by Mr. Whipple for having the change made in the machines as represented by the model marked "Cleveland vise?"

A. He did not mention any reasons given if I recollect right.

X Int. 10. Did he say anything to you in regard to it? If so, what in regard to any change being made in the machine by having the bottom taken out, as represented in the model marked "Cleveland vise?"

A. My recollection serves me, and I think that I am pretty correct, that, as I have said before, he said there had been a man there giving directions how to have it changed.

X Int. 11. Didn't he state any reasons why this man, Mr. Whipple, wanted this change made, and the object for having it made?

A. I think not. I have no recollection that he gave me any reasons either one way or the other for having it changed.

X Int. 12. Is the machine used now, since this change was made, like the model marked "Cleveland vise" in every particular?

A. It is the same as model marked "Cleveland vise" in every particular.

X Int. 13. Is there not a roll attached to the back end, or furtherest end from the furnace, resting or supported by strips of iron riveted to the frame of the machine, the roll acting as a support to the rail when placed in the machine?

A. We have some machines with a roll so attached, which is for the purpose of rolling the rail into the furnace; in some of the machines we have no roll attached.

882 X Int. 14. Are not all the machines used for repairing the rails in the Cleveland shops with this roll referred to atattached to them, and what places on the line of the road do they use machines without any roll attached?

A. I think all the machines used in the Cleveland shops have the roll attached. I have not noticed in particular whether they are on or not; they may have taken them off for all I know; machines without the roll are used at Norwalk. I don't know whether the rolls are attached to the machines at Kingsville or not. I have been away some time, and have not been at Kingsville since.

X Int. 15. How do you know whether they are attached to the machines at Norwalk or not?

A. Why, I have seen the machines, and did not see any attachment to them that I have noticed.

X Int. 16. Is there any other things attached or used in connection with this machine used in the Cleveland shops, with the bottom taken out, as shown by model marked "Cleveland vise," while repairing the rail? If so, state what it is fully.

A. Well, I don't know; of course we have had several things for bringing the rail in up to the anvil or to the fire, such as rolls and a runaway, but they are not attached to the anvil; these things I spoke.

X Int. 17. Do you or have you had an anvil placed close to the machine, next to the furnace, and coming up as high, close outside the jaws, as the anvil was before it was cut out, as represented by model marked "Cleveland vise?"

A. I think we have such an anvil at the Cleveland shop, but not at the other shops; they have been lately fitted up; since the change was made I haven't had time to see just what the fixtures were or changes.

(Objection—Complainant objects to the use of this model in connection with the evidence as not showing fully the whole mechanism
883 and appliances as used in repairing rails, and also the evidence of this witness, as he don't appear to understand, from his own knowledge, anything about how the machine is used with these appliances since the change has been made and the bottom taken out.)

(Defendant rejoins that the proofs in the case show that no such appliances as referred to by complainant are used at the shops at Norwalk, for the reason that they are not necessary in patching rails.)

X Int. 18. Are the accounts of the rail-repairing shop kept or returned to you?

A. They are kept by my orders and returned monthly to the chief engineer.

X Int. 19. Is that all you know of the accounts of rail-patching as to the amounts done per day, week, or month, by looking at said accounts in the book of the company, or the one that keeps said accounts?

A. Well, the way that I manage in this, I frequently ask the foreman

if the men turn out as many rails as they should, calculating about seventeen rails to a fire for a day's work. I occasionally have the month's labor handed me, and make comparisons to see whether as many rails are turned out during the same time in previous months.

X Int. 20. Do you find, on making these comparisons, that they have averaged seventeen rails per day, during the time in which you have been connected with the road, at a fire?

A. Well, I can't say that that has been an exact average; some months they may go a little over and some months a little under; it is about that, though, for a day's work; that is what I calculated to have them average during the time I have been connected with the road, about seventeen rails per day; my impression is they will run under that number a little. I have given men to understand that I wanted they should get out seventeen rails per day at each fire.

X Int. 21. Do rails in the same months in different years re-
884 quire the same amount of patching per rail; if not, please explain what months during any year rails require the most patching or the least?

A. It is owing to the different quality of iron we have in the rails, and the amount of service the rail has to perform, and the temperature of the weather. We repair rails in this way when a rail is badly worn; so badly that we don't think it economy to repair it, we don't repair it. There has been times that we have repaired rails that we wouldn't have repaired at other times; that would be owing, perhaps, to the want of better rails. We have a point wherein we stop in repairing rails. Ordinarily we repair at some times which we wouldn't repair at other times. In that case generally it would be owing to the want of better rails. Rails require more patching during those months in which the ground is frozen the harder and deepest, and that the cold weather is most severe, and the traffic is the heaviest. Rails require the least patching when the road-bed is in good condition, ground free from frost, and when there is the least traffic on the iron.

X Int. 22. Supposing in October, 1868, or any year previous to that in the same month, you repaired four hundred and forty-two rails, which is an average of seventeen rails per day for twenty-six days in that month, and you repaired four hundred and forty-two rails in the same month in each year previous to that or since; would these rails all require the same amount of patching in feet or inches during said month, when there was *was* an exact number of rails repaired, or would they require some years more patching and some years less patching on the same number of rails?

A. They probably would not just the exact number of feet or inches during the same month; they might and might not. It would depend upon circumstances whether the same number of rails would require more or less patching.

X Int. 23. Is there any account kept of the amount of patching in feet or inches?

A. There is not.

885 X Int. 24. In answer to the 21st interrogatary you say, "We have a point where we stop in repairing rails ordinarily;" what is that point or rule you are governed by in patching rails?

A. Well, it is about three feet.

X Int. 25. What about the proportion or average of patching done to the rails in feet or inches?

A. Well, I should think it would average a little under two feet.

X Int. 26. What is it costing the company at the shops in Cleveland per rail for their repairs?

A. I don't know exactly; the labor and material used is reported to the chief engineer; he knows what it costs, I think.

X Int. 27. How many men are employed at each fire, and the wages of the same per day; amount of coal or coke used at each fire per day, the cost of the coal or coke; the kind of fire and how blown; and what number of hours do the men work for a day's work?

A. Three men are employed at each fire; the wages of the men are not all alike; they range from $1.75 to, I think, $2.50; never weighed the amount of coal or coke used at each fire per day; we use a coke-fire, blown by steam power; ten hours is considered a day's work.

X Int. 28. What width and thickness is the iron used for patching rails, and the cost of the same, or what has been the cost?

A. Two inches wide, and we have used ¾, ⅝, and ½ inch in thickness; we have paid from 2½ to 3½ cents per pound, and perhaps a little more than that; during the war iron was high.

X Int. 29. About what is the average weight of the iron used in patching rail per foot?

886 A. I couldn't say what it would average; I should think it would average between four and five pounds; we don't use much ¾ iron at the present time.

X Int. 30. About what is the weight of the machine used in repairing rails, as represented by the model marked "Cleveland vise," and length of the jaws, and how operated?

A. Don't recollect the weight, but should think it would weigh about 1,200 pounds, all complete; the model is one-fourth size, which would make the jaws 26 inches; the machine is operated by a rack and pinions, as represented in model marked "Cleveland vise."

X Int. 31. Do you employ practical blacksmiths as foremen of each fire in repairing railroad rails?

A. We have what I designate as a practical blacksmith; it would be a man capable of doing nearly all kinds of blacksmith work; we have employed men in repairing rails that were practical blacksmiths, and some men that learned to repair rails by acting as helpers in repairing rails.

X Int. 32. Do the foremen of each rail-fire get as much per day as your practical blacksmiths that work at other kinds of blacksmithing?

A. I don't whether they would average as much; they probably don't get so much wages as our first-class practical blacksmiths.

X Int. Int. 33. What wages do you pay first-class practical blacksmiths per day?

A. We pay from $2.75 to $3.25 per day.

X Int. 34. Suppose you discard the jaws of the machine for repairing rails, the rail having nothing but a bottom support while being patched, what would be the effect on the rail while patching it properly in this manner?

A. In putting the patch on it would be apt to get the rail out of shape, and after the patch was on we would have to put it into the right shape; it would be apt to upset it in the web or neck; it would be apt to get it out of shape under the head more than it does by being held in the jaws.

887 X Int. 35. Can the men employed at the present time in patching rails repair the fish-joint rail that is used in the road properly and successfully as a business, with only a bottom support to the rail?

A. The thing can possibly be done by being held in the jaws. I

should judge the men employed now could not repair such rail successfully with only a bottom support. I mean by "successfully" that they cannot do it with the same profit as with jaws. I am very positive, and know they could not do it without jaws. The bottom support I care nothing about.

X Int. 36. Do you cut off rails in the machine as represented by model marked "Cleveland vise?"

A. We do cut off the end of the rail.

X Int. 37. What is the effect upon the flange of the rail in cutting it off without any bottom support?

A. We have not had any bottom support for years. In cutting the rail off, when we get it almost cut off, the end cut bends down and is a little ragged. We hit a few blows with the hammer if there is any point not very smooth.

X Int. 38. Does it ever split the flange off the bottom of the neck of rail?

A. I never have seen any split off, but in case the iron was poor it might crack the bottom of the neck a little.

Redirect examination:

Int. 12. You say that you think that the average amount of work at each fire per day is seventeen rails, and that you think the average in each rail is a little less than two feet. Are you quite sure the average is as high as you have stated it?

A. Well, I think I may be a little high, but if there was a little less, if they averaged a little less than two feet, I think the men would get out very near seventeen rails per day.

Int. 13. How many feet do you judge to be a fair day's work of weld to one fire?

888 A. I think that about thirty feet would be a fair, good day's work. I should be satisfied with it.

Int. 14. Do accounts kept and rendered show this amount of work done in feet or inches?

A. No; the account is not kept in feet or inches.

(Signed) A. CONGDON.

NORTHERN DISTRICT OF OHIO, *ss:*

I hereby certify that the foregoing are true copies of depositions taken by me in behalf of the defendants in the above-mentioned cases at the city of Cleveland, Ohio, on the 6th, 7th, and 8th days of January, A. D. 1870.

CHARLES H. ROBINSON,
U. S. Commissioner for said District.

889 United States circuit court, northern district of Illinois.

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL RAILROAD COMPANY AND John M. Douglass. } In chancery.

SAMUEL H. TURRILL
vs.
CHICAGO, BURLINGTON AND QUINCY RAILroad Company and Amos T. Hall. } Same court.

SAMUEL H. TURRILL
vs.
MICHIGAN SOUTHERN AND NORTHERN INDIANA Railroad Company and E. B. Phillips. } Same court.

SAMUEL H. TURRILL
vs.
CHICAGO AND ALTON RAILROAD COMPANY and T. B. Blackstone. } Same court.

SAMUEL H. TURRILL
vs.
PITTSBURG, FORT WAYNE AND CHICAGO Railroad Company, etc. } Same court.

890

891 *Testimony.*

Testimony taken on the part of the defendants in the matter of accounting herein before me, W. C. Witter, notary public N. Y. Co., and pursuant to consent of complainant, S. H. Turrill, and S. M. Whipple, counsel for defendants.

NEW YORK, *April* 18, 1872– at 10 a. m.

Present: Complainant, in person, and Charles M. Reed, his counsel, and S. M. Whipple, counsel for defendants.

JOHN M. TOUCEY, a witness of lawful age, produced on the part of the defendants, having been first duly cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter of accounting herein, and being examined by S. M. Whipple, counsel for defendants, deposes and says as follows:

Q. 1. What is your name, age, residence, and occupation?

A. John M. Toucey; 42 years of age. Reside in Poughkeepsie, N. Y. Am superintendent of the Hudson River division of the New York Central and Hudson River Railroad.

Q. 2. How long have you been connected with the Hudson River Railroad, and in what capacities?

892 A. Eighteen years; as conductor eight years, assistant superintendent for six years, and superintendent over four years.

Q. 3. While you have been superintendent has the Hudson River Railroad Company repaired railroad-rails?

A. They have.

Q. 4. Does said company continue to repair rails?

A. They do not.

Q. 5. How long since they discontinued the practice, and for what reason did they so discontinue? Please answer fully the last branch of the question.

(Objected to.)

A. In 1861 or 1862, or about that time, we repaired rails for the main track quite extensively. We then discontinued it, and only repaired for sidings. We discontinued it for the reason that many of the rails broke immediately back of the weld. Our mode of welding was only with the anvil and hammer, which left the rail rough and uneven on the top

We then abandoned it and cut off rails whenever they became laminated sufficiently. Since 1864 we have repaired none at all.

Q. 6. Please state, if you know, what it cost your company per lineal foot to repair rails on common anvil.

A. I couldn't answer that.

Q. 7. Assume that it cost your company from 60 to 65 cents per lineal foot, and that the work could be done for 40 cents per lineal foot, would it, in your judgment, be profitable for the company to repair its rails, providing the work was well done and no more liable to break than new rails, and were equally as even when laid on the track?

(Objected to.)

893 A. Well, I am not well versed enough in that matter to give a definite answer to that. I never considered that we could repair a rail and make it as good as new. At least it never had been done with us, and for the reason there was no economy in transporting the rails two or three times over the road and spending that amount of labor on them to mend them.

Q. 8. Do you, or not, in your judgment, get a better rail by cutting off the laminated end instead of repairing the same?

(Objected to.)

A. That was our impression, that we got a better rail, unless it was shortened too much. We cut the 21 rails into 18 rails, the 24 into 21; those were our three lengths—24, 21, and 18 foot rails. The 18 foot rails we threw into scrap or put into the siding.

Q. 9. Was this your usual practice in the latter part of the time in which you repaired rails?

(Objected to.)

A. It was after we suspended repairing rails—abandoned it. This was in 1863 or 1864; I don't remember which.

Q. 10. Did you or not pursue this course to some extent during the time you were repairing rails?

(Objected to.)

A. Yes, sir.

And, being cross-examined by complainant's counsel, Chas. M. Reid, esq., the witness deposes and says:

Q. 11. What kind of rails are now used upon your road, and how long have you used them?

A. We have both the fish-rail and the pear-shaped-head rail, known as the common T-rail. We have rails in the track that have been in eight years—in the main track, that is; I am not speaking of siding.

894 Q. 12. How large a proportion of the rails now used by you are what is termed the fish-rail, and is not the greater part of the main track laid with such rails?

A. Two-thirds of our track about are laid with the fish-rail—that is, the fish-joint.

Q. 13. How long has this pattern of rail been used by your company?

A. It is four years since we commenced laying them.

Q. 14. In your answer to interrogatory eight you say that it was your impression that you got a better rail by cutting off the laminated end instead of repairing it. Is this impression founded on any exact calculation of the quality of the rails as repaired with those cut?

A. It is not founded on calculation, but on observation and experience.

Q. 15. When you repaired rails by hand upon the common anvil, how

far were the rails carried from the place where they were laid to the place of repair?

A. The average distance you might say was thirty miles.

Q. 16. Had you any personal superintendence of the repairing of rails, or was this done by others and the result reported to you?

A. I was not in the shop when the work was done very often. It was done under my direction after 1861.

J. M. TOUCEY.

Subscribed and sworn to before me this 18th day of April, 1872.

[SEAL.] WM. CLITUS WITTER,
Notary Public N. Y. County.

JAMES H. HOYT, a witness of lawful age, produced on the part of the defendants, having been first duly cautioned and sworn to
895 testify the truth, the whole truth, and nothing but the truth, in the matter of accounting herein, and being examined by S. M. Whipple, counsel for defendants, deposes and says as follows:

Q. 1. What is your name, age, residence, and occupation?

A. James H. Hoyt; 63 years of age; reside in Stamford, Conn. I am superintendent of the New York and New Haven Railroad.

Q. 2. How long have you been superintendent of the New York and New Haven Railroad?

A. It will be eighteen years next month.

Q. 3. During that time has your company repaired railroad rails? If so, about what time did they begin to make such repairs?

A. We have repaired railroad rails, and it was previous to 1863 when we commenced.

Q. 4. Do you still continue to repair rails?

A. We do not.

Q. Why not? Please give your reasons for discontinuing the repairing of rails.

(Objected to.)

A. We found that it was not to our advantage to repair them, and discontinued some four or five years ago; I should think about five. Our reasons were because it was not to the interest of the company to repair them. The expense of picking up the rails and distributing them again, and the work upon them at the shop, did not warrant our continuing it. The rails did, in many cases, break near where they were repaired, and we came to the conclusion not to repair any more, and have not done so for the last four or five years.

Q. 6. When you did repair rails, what did it cost you per rail, per foot, or end, or in whatever way you may have kept the account?

896 A. I had an accurate account kept, and the expense laid out upon each end was, in the year ending March 31, 1853, on an average, 45 cents each end. In my report I have said a fraction over 45 cents. I refer to a printed report of mine for the year ending March 31, 1863. Those were repaired from . I should judge the average was about twelve inches—from 6 to 18 inches, not exceeding 18. These rails were what is known as the common T-rail, weighing about 64 pounds to the yard.

Q. 7. Were there any clamping jaws used for holding the rail in the process of repairing?

A. No, sir. We used the common anvil and common hammer.

Q. 8. Since you discontinued repairing rails, what disposal do you make of rails when they become laminated or battered on the ends so as to become unfit for further use in that condition?

(Objected to.)

A. We either cut off the ends, or put them in the side-tracks, or sell them for old iron. Where they are not very bad, and we want them for side-tracks or gravel-pits, we use them.

Q. 9. What has been your experience as to the comparative value of rails which have had their battered ends cut off, compared with like rails which have been taken to the shop and repaired, and returned to the track?

(Objected to.)

A. I have never heard any report of their being liable to break when cut off. We have never done as much in the way of cutting off rails as we did in repairing. We preferred the rail that was cut off to the rail that was repaired, and that was the reason why we discontinued repairing. The comparative difference, I don't know as I could give exactly.

897 Q. 10. Why do you prefer the rail cut off to the rail repaired?

(Objected to.)

A. Because it costs less money and is less liable to break.

Q. 11. Suppose you could have your rails repaired for half the sum per end which you say it cost you when you did repair rails, would you in such case deem it advisable for your company to resume the repairing of rails?

A. I should not.

Q. 12. Why not?

(Objected to.)

A. I should not, because I would not consider it to our advantage to have them repaired, if they were repaired without cost. Our road is an important trunk road. We run it fast, with heavy engines, and could not afford to have rails put in our track where there is the least doubt as to their safety.

Q. 13. Do your connecting lines repair their rails; I mean those of other companies?

A. I don't think I could say positively about all of them, but I think none of them do.

Q. 14. Please name your connecting lines, which you think do not repair rails.

A. New Canaan, Naugatuck, Hartford & New Haven, the Shore Line and New Haven & Northampton. These do not; but as to the Housatonic and the Danbury & Norwalk, I am not positive.

And, being cross-examined by Chas. M. Reed, esq., counsel for complainant, he deposes and says:

Q. 15. Can you state how large a proportion of the rails were mended only six inches at each end?

A. Well, I should think one-third of them.

Q. 16. How large a proportion were mended eighteen inches at each end?

A. About one-quarter.

898 Q. 17. Do you know how many rails per day were mended at each forge or fire?

A. I do not; I know how many were mended during the year, but per day I could not tell.

Q. 18. Do you know how many men were employed at each fire, and what their wages per day were during the year?

A. I think the number was three. Their wages varied according to the men, say from two to three dollars a day.

Q. 19. Do you know how much wages per day was paid the men at each fire?

A. Not having worked at it for some years, I do not remember. We haven't done anything at it for some five years.

Q. 20. Do you know what the price of coal and patch-iron was during the year 1863?

A. It was more than at present, but how much more I could not say.

Q. 21. What is the greatest amount of patching which you allowed to be put upon a single rail?

A. My impression is eighteen inches, but I will not be positive, but I let them go as high as twenty.

Q. 22. You would not, then, put eighteen inches on each end of the rail?

A. Yes, I would; if both of them came suitable to do so, and I did at that time, but afterwards I confined them down to a foot, toward the last.

Q. 23. Can you state what the average price per foot was for mending during any year beside that ending March 31, 1863?

A. That is the only year that I kept an accurate account of its cost and made a record of it. I did not allow them to exceed fifty cents on and after this reckoning.

Q. 24. Please state what items were taken into consideration in making up the account of cost per foot?

A. The wages of the men, the iron used for the repairs, the cost of the coal.

899 Q. 25. What kind of rail is now used on your road?

A. The fish-plate rail.

Q. 26. How long have you used this pattern of rail?

A. I think we used a small quantity four years ago. We have used it for all the new rails we have bought for three years.

JAMES H. HOYT.

Subscribed and sworn to before me this 18th day of April, 1872.

[SEAL.] WM. CLITUS WITTER,
Notary Public, N. Y. Co.

N. Y., *May* 14, 1870—2½ p. m.

Present, complainant in person and S. M. Whipple, counsel for defendant.

I. C. BUCKHOUT, a witness of lawful age, being produced on the part of the defendants, and duly cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of accounting herein, and being examined by S. M. Whipple, esq., of counsel for the defendants, deposes and says as follows:

Q. 21. What is your name, age, residence, and occupation?

A. My name is I. C. Buckhout; I am 39 years of age; reside in White Plains, and am general superintendent and chief engineer of the New York & Harlem Railroad.

Q. 22. How long have you been engineer and superintendent of the Harlem Railroad?

A. Engineer about 20 years; superintendent about eight.

900 Q. 23. During that time have you repaired railroad-rails on your line, and do you still continue to repair rails?

A. Yes, to both branches of the question.

Q. 24. To what extent are you now repairing rails?

A. We have three shops, with about nine fires, nine or ten in them; that is, about three in each shop.

Q. 25. Do you know what it costs the Harlem Railroad Company to repair rails per lineal foot or inch?

A. In 1868, 1869, and 1871, it cost abou from 60 to 64 cents per lineal foot; 60 in 1868, 64 in 1869, and 64 in 1870. That includes the new material.

Q. 26. Is this statement from actual accounts kept by the company, and reported to you as engineer and superintendent of the same?

A. It is.

Q. 27. Assume that the Harlem Railroad Company could have their rails repaired for forty cents per lineal foot, would it, in your judgment, be for the interest of said company to repair their rails?

(Objected to.)

A. I think not, for the main line.

Q. 28. You will please give your reasons for this answer.

A. We found that the repairing, particularly of the end of the rails, resulted in a great many accidents from the welding, and then breakages just back of the piece put in, that is, at the end of the rail, and I gave orders not to repair the ends, but to cut them off, and jump them or weld them at the centre; take two long pieces and weld them at the centre.

Q. 29. Do you wish to be understood that you repair no rails at the present time to be used in the main track; that is, by welding a patch into any part of the rail?

A. There are none put in the main track that are patched, to my knowledge.

901 Q. 10. As near as you can judge, what portion of the number of fires that are now running on rail repairs are used in welding or jumping rails together instead of patching them?

A. About all of them.

Q. 11. Then but very little is done in patching rails, even for the side-track? Am I correct?

A. Yes, sir.

Q. 12. What is the machinery or tools used for patching rails on your line?

A. We use the ordinary anvil and swage.

Q. 13. You say you cut off the rail when it becomes unfit for further use in the track by being broken or laminated. At what expense do you cut off rails, in your judgment, cash, per rail?

(Objected to.)

A. I should say about five cents per rail.

Q. 14. What, in your judgment, would it cost to take the same rail to the shop and repair it and return it to the track, assuming that the average weld on the rail is 18 inches?

A. Well, I should say from 60 to 70 cents.

Q. 15. What is the average on a rail per lineal foot for the welding which you did for the years 1868, 1869, 1870?

A. One foot and a half per rail.

Q. 16. Is this foot and a half per rail in the same account already given, in which you state the cost per lineal foot?

A. It is.

Q. 17. Have you also, in said account, the cost of labor, aside from materials used? If so, please state the sum per lineal foot.

A. I hav'n't it separable. The figures given above include all the cost as reported to me.

Q. 18. Is there or not, according to your judgment and experience, economy in repairing railroad-rails to be used in the main track, even if it could be done at a merely nominal cost?

(Objected to.)

A. There is not, in my opinion.

902 Q. 19. Will you please give your reasons for this answer?

(Objected to.)

A. The cost of transportation to and from the shop, the cost of repairs, the short time they are in use after being replaced, and the great danger in using them at all.

And being cross examined by S. H. Turrill, the complainant, the witness deposes and says:

Q. 20. Do you know, of your own knowledge, as to the account which you have given as to the cost of repairing rails in the years 1868, 1869, 1870?

A. I didn't keep the books. They were kept by a competent man, with orders to keep a close account of all costs in detail.

Q. 21. Did he measure and keep account of the work done at each of these shops, daily, monthly, or yearly?

A. Each foreman of each shop measured, kept accounts, and returned them to the general clerk, the accounts being kept by the foremen daily.

Q. 22. What goes in to making up that account of the cost of repairing rails?

A. Labor, materials, transportation.

Q. 23. How much iron does it take for a foot of repairs, on an average, by weight?

A. I couldn't say.

Q. 24. How much coal?

A. I couldn't say.

Q. 25. How many men do you use at a fire, and what are the wages of the same?

A. Two and three at a fire. The wages vary now, I think, from $1.75 to, I think, $3.00 per day.

Q. 26. What was it during the years 1868, 1869, and 1870?

A. It varied from $1.50 to $3.00.

Q. 27. How long since you abandoned repairing rails to be put in the main track?

A. We hav'n't abandoned it.

903 Q. 28. How long since you abandoned putting patches upon rails for use in the main track, as general practice?

A. We abandoned the patches of the end of the rails, or rather my orders were given to the road-master to that effect last fall.

And here, being examined on the redirect by S. M. Whipple, witness deposes and says as follows:

Q. 29. What, in your judgment, would be the average cost per ton of transporting rails on your line to the shops for repairs and returning the same to the track for further use?

A. I think two dollars.

Redirect:

Q. 30. How many rails, on an average, does it take to make a ton?

A. I should think five rails on an average.

And being recross-examined he says:

Redirect:

Q. 31. What is the difference between transporting rails to a shop,

having them repaired and returned again to the track, and transporting the rails the same distance and returning new iron to put in the track; what would be the difference in the cost?

A. The cost of getting the rails to the shop would be greater than transporting new rails, for the reason that the old rails are just, as a general thing, picked up on the line, carried on hand-cars to stations, unloaded, reloaded, and carried to the shops on flat-cars. New rails are hoisted from the boat right onto the cars on our road. As to how much the difference is, I am not able to say. It doesn't cost any more to carry a new rail a certain distance than it does to carry an old rail the same distance.

ISAAC C. BUCKHOUT.

Subscribed and sworn to before me this 14th day of May, 1872.

WM. CLITUS WITTER,
Notary Public.

904 Copy of evidence taken before W. E. Simmonds, notary public, at Hartford, Conn., on the 19th day of April, 1872, on behalf of the respondent, in the suit of Turrell vs. The Ill. Central R. R. Co., now pending in the U. S. cir. court for the northern district of Illinois, to be used before the master on accounting.

EDWARD M. REED called:

Q. What is your name, age, residence, and occupation?

A. My name is Edward M. Reed; age, 51 years; residence, Hartford, Conn.; occupation, superintendent of the Hartford and New Haven Railroad, and have been so for 18 years.

Q. Have you had any experience in mending railroad-rails?

A. I have. About 14 years ago we commenced to repair our iron rails when they were damaged, and continued to do so, more or less, for about three years. We discovered it was a non-paying business; that they were dangerous and unsafe to put back on the road. We found it both unsafe and unprofitable.

(The last part of answer, to wit, that which related to the reasons for abandoning the mending, objected to by counsel for complainant as irresponsive and irrelevant.)

Q. While you repaired rails, what sum were you in the habit of expending on a rail in the way of repair?

A. From 75 cts. to a dollar and a half per rail, according to the length of the patches put on. If a rail was patched on one end the expense would not exceed 75 cts., in many cases less that 75 cts. When we patched on both ends with long patches, the expense would often amount to a dollar and a half. The length of these patches was from six to fifteen inches; seldom less than six inches, often more than fifteen.

905 Q. Since you have discontinued repairing rails, what do you do when a rail, otherwise sound, is battered or laminated at one end or both ends?

(Objected to by counsel for complainant.)

A. If it was battered or laminated at both ends, we should throw it away. It is pretty good evidence that it is unsound all the way through. If one end was battered—in many cases we have them so—we should cut it off to a point where it appeared sound and use it again. By that means, we get the better part of the rail for use again on the track.

Q. What sum, if any, in your judgment, could your company afford

to expend on a rail that was slightly battered at one end, and thereby unfit for further use, in way of repairing the same?

(Objected to.)

A. More than ten years ago, after looking the matter over with care, we came to the conclusion that we could not afford to expend any money in repairing rails. Our reasons for it were that a rail that failed at either end or in the middle was apt to be more or less unsound throughout its entire length, and that when patched and put back on the track it soon failed in some other part; and, again, when patched at the ends or end for a foot or more in length, they were very apt to break at the end of the patch. We found that so many of these rails were breaking, we found it necessary to take them out of the track, those that were not broken. We were afraid of them.

Cross-examined:

Q. By what process did you repair these rails?

A. By trimming off the tops to a point beyond where it was battered, broken down, and melting on a new head, from six to fifteen inches or more as the rail required.

906 Q. What machine or block did you use to do the work on? Was it what is termed the common anvil or swedge-block used in repairing rails?

A. It was a swedge-block, made by the company to fit the sides of the rails which we had in use. We had a number of them at one time; we had three or four fires.

Q. Do you know what caused the rails which you patched to break at the end of the patch?

A. Well, it was more than one cause. In the first place, the old-fashioned T-rail laid on chairs is more apt to break at or near the first tie from the chair than at any other point. Rails that were patched seemed to be injured below the patch by the heat necessary to melt them. A very large number of our patched rails break under the patch, probably from the bad effect which the heat had upon the iron of the rail.

Q. Why is a rail more apt to break at the first tie from the chair-tie, if the chair-tie is balanced up and solid on a line with the second tie, than at any other portion of the rail?

A. For the reason that it is almost impossible to keep the chair-tie up to its place. It is the weakest part of the track. When the chair-tie settles, a leverage is formed over the next tie to it, subjecting the rail at that point to a greater strain than it had to bear with the same load at any other point.

Q. Do you find that trouble with the fish-joint rail?

A. We do to some extent, and particularly where we have used fish-joints for the same pattern of rail as heretofore used with chairs; but where we have since used rails of deeper section, made expressly for fish-joints, we have had less trouble with the joint-ties, for the reason that the fish-plates strengthen the joint and enable it to carry a load

907 nearly equal to what the rail will carry between the joints. With a rail five inches in depth, it is possible to make the strength of the joint equal to the strength of any other part of the rail.

Q. At the time that you were repairing rails, did you have any rails break at the point you speak of which had not been repaired?

A. Yes, we did, and have had since; that is the place where ninety per cent. of all rails break, whether they are repaired or not. We found all this time that of the whole quantity of rails broken a large proportion of them were mended rails, while the number of mended rails in the track was very small, as compared with the whole number of rails.

Q. Which will break first, a hard or a soft railway-rail, at the point you speak of?

A. Well, a great deal depends on the quality of the iron, whether it be hard or soft. We have had some soft rails that were not strong. As a general thing, soft iron is not so easily broken as hard iron.

Q. When a rail has been heated and patched, is the rail harder or softer than it was before it was patched, several inches back of the patch?

A. I think the character of the iron would be changed by crystallizing to some extent at the point where the heat was not sufficiently strong to change its color to a red.

Q. Does iron crystallize by partially heating it?

A. Yes.

Q. Why? Give your reasons.

A. My reasons are my own experience; I can prove it by a great many different experiments. The first thing that called my attention to it was the fact that the bolts used to connect the steam-pipe joints in the smoke-boxes of locomotives became crystallized after being used some months in that place. The fire-boxes of locomotives became crys-
908 tallized. A rail heated for the purpose of welding on a patch is heated to a less temperature at a point a few inches back from the welding-point, and consequently, to some extent, injured. I have known rails to be bent and twisted by the heat of buildings and other material destroyed by fire near the tracks. Although the rails were strengthened and put back on the track again, they soon after showed themselves to be badly damaged by the heat.

E. M. REED.

Copy of evidence taken before W. E. Simonds, notary public, at Hartford, Connecticut, on the 19th day of April, 1872, on behalf of the respondent, in the suit of Turrell v. The Illinois Central R. R. Company, now pending in the U. S. circuit court for the northern district of Illinois.

SAMUEL NOTT called:

Q. What is your name, age, residence, and occupation?

A. My name is Samuel Nott; age, 67; residence, Hartford, Connecticut; and occupation, superintendent of the Hartford, Providence and Fishkill Railroad; have been so for 15 years. Am a civil engineer by profession.

Q. Do you mend railroad-rails on your line; and if so, to what extent have you done so, and to what extent are you now doing the same?

A. We do mend railroad-rails on our line. We have mended them for the last 14 or 15 years. We have gradually reduced in quantity, until last year we mended 2,600 rails, mainly 18-ft. rails. I have not examined since January last, but my belief is about the same for this year as in 1871; no more, I think.

Q. Why have you from time to time reduced the quantity of rails repaired?

(Objected to.)

909 A. From feeling that it was of doubtful expediency, of little or no profit.

Q. When a rail becomes battered at the end, what course do you pursue when such battering renders it, in that state, unsuitable for further use in the track?

A. In many cases we cut off—in most cases now—the battered end, and we use such cut-off rails in all ways, in the main track more than anywhere else. As a rule, we do not put into side-tracks as good rails as these would be.

Q. What sum, in your judgment, have you expended in repairs upon a rail, upon an average?

A. I don't remember the cost now. I looked the subject over early in the year quite carefully, and from the experience of 1871, I was satisfied that we did not gain more than two or three dollars a ton over the expense of buying new iron. Our annual mileage is about 500,000 miles on about 130 miles of road. There is no way of demonstrating the absolute correctness of that estimate of saving. On thinking of it farther, I am doubtful about there being that saving. At any rate, with any material increase in our business, I don't believe there would be any saving in repairing rails, all things considered.

Q. Suppose that you could have your rails repaired for one-half the cost which you are now to, would it in such case or not, in your judgment, be for the interest of your company to repair the rails?

(Objected to.)

A. I think that the whole scheme is of doubtful expediency—from the light I have—altogether. A road of small business like ours would get some gain from it longer than a road of large business. If we could reduce the cost one-half, we should perhaps continue to repair longer than we should at the present cost, but my belief is that we shall abandon the whole thing before a great while.

910 Q. Please state briefly why you will abandon the whole thing.

(Objected to.)

A. Well, in general, it is because it is a complicated, troublesome way of doing things, which, for that reason, will die out as business increases. The labor of picking them up and mending them is considerable. There is delay of cars for the purpose just at the season of the year when we want all our cars for use. It is more or less in the way when lying around at the principal station where it comes in for repairs. On the whole, it is one of these nuisances that roads doing any respectable amount of business can't afford to go into.

You have stated that you are in the habit of cutting off the battered end instead of taking the rail to the shop for repairs. Is or not such a process more economical than freighting the rails to and from the shop for repair, even at a nominal cost?

A. I think the culling process is much the most economical.

Cross-examined:

Q. Do you repair rails on what is known as the common anvil or swage-block, with grooves to fit the sides of the rail?

A. We use what we call a swage-block with grooves in it.

Q. Do you cut your rails hot or cold?

A. We cut them cold generally.

SAMUEL NOTT.

911 Circuit court of the United States, district of Illinois.

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL R. R. CO.

APRIL 30, 1872.

CHARLES L. HEYWOOD, being first carefully examined, cautioned, and

sworn, deposes and says, in answer to interrogatories propounded by S. M. Whipple, esq., for the defendants, as follows:

Int. 1. Please state your name, age, residence, and occupation.

A. My name is Charles L. Heywood; age, forty-four years; residence, Bellmont, Massachusetts; and I am superintendent of the Fitchburg Railroad, and have been for about eight years. Prior to that I was road-master, having charge of the track for about eight years.

Int. 2. During the time you have been so employed, did your company mend railroad-rails; if so, about when did they commence and when did they discontinue?

A. They did. They commenced about the year 1852 or 1853. They discontinued about the year 1865.

Int. 3. For the latter part of the time which you repaired rails, what kind of machinery did you use for holding the rail during the process of repairing?

A. They were clamps corresponding with the sides of the rail to be mended. My impression is that a cam was used for sliding the clamps back and forth on the rail.

Int. 4. What kind of a hammer was used in welding on the patch and dressing it off?

A. A steam drop-hammer, a drop hammer operated by steam. There was a die on the top of the hammer which corresponded with the top of the rail to be mended.

912 Int. 5. What were the lengths and weight of the different rails so mended; that is, weight per yard?

A. Mostly eighteen feet, and fifty-six pounds per yard. A small part were twenty-one feet long, and fifty-five or sixty pounds per yard.

Int. 6. What length of patch-iron in lineal inches were you in the habit of welding on a rail on an average?

A. About eighteen inches.

Int. 7. Did you keep an account of the cost of mending rails? If so, in what way did you keep it, and what was the cost, including labor, coal, iron, tools, and handling the rails, if such an item was included?

(Objected to.)

A. An account was kept by taking the wages paid and the average amount of coal used, estimating the power required in the shop and use of shop. All the items mentioned in the question were reckoned in, and the cost was estimated at about a dollar and a quarter per rail. It varied some with circumstances.

Int. 8 You have testified that you discontinued repairing rails about the year 1865; please give your reasons for so doing as fully as it may occur to you to be proper.

(Objected to by complainant.)

A. In the first place, as a matter of economy, we couldn't afford to. Among the reasons was, first, on account of increasing the danger of rails breaking; then the large expense of collecting, transporting, sorting, to get them to and from the shop; and, after being mended in the best manner we could devise, it left a rough track.

Int. 9. What expense, if any, could your company afford to be to in the repairing of rails, aside from the cost of transportation to and from the shop?

(Objected to by complainant.)

913 A. They could not afford to have them repaired without expense, unless the whole rail was heated and made over at the same time.

Int. 10. Since you have discontinued repairing rails, what methods

have you resorted to to get a further service from a rail which has become laminated or exfoliated at the ends, or any other parts of the rail?

(Objected to by complainant.)

A. The injured ends are cut with a coal-chisel by the men on the spot, and, with the use of iron hand-cars, are moved to a section where even lengths are laid down together.

Int. 11. At what expense is the rail cut by cold chisels upon the track, per rail or per cut?

(Objected to by complainant.)

A. Five to eight cents per cut.

Int. 12. About what would be the expense of transporting an eighteen-foot rail to the shop to be repaired by the former method, and returning the rail to the track?

(Objected to by complainant.)

A. About two dollars per ton; about five rails to a ton.

Int. 13. What are the different lengths of rails now in use on your road?

A. Mostly twenty-four feet; a small number from three feet to twenty-four, but a very small portion less than ten feet.

Int. 14. Please name the different lengths of rails between twenty-four feet and ten feet, as a general rule?

A. Twenty-two, twenty, eighteen, and all even feet in smaller quantities.

Int. 15. Have these different lengths of rail been made by cutting down, from time to time, as occasion required, from twenty-four feet rails, or not? Please explain.

914 A. They have, since we have adopted twenty-four feet as the rule for the highest length of rail. Formerly original iron bought was twelve and eighteen feet, and twenty-one feet, as a rule.

Int. 16. By what means do you make it safe to use short rails on your track?

(Objected to by complainant.)

A. By the use of a chair, which makes the joint the strongest part of the track.

Int. 17. Will you please describe the construction of the chair, and how it operates to strengthen the joints, so as to make it equal in strength to the other part of the rail?

Objected to by complainant.)

A. By the use of an iron plate about three-eighths of an inch in thickness, turned up on each side for a truss, which is placed on two sleepers about six inches apart—which plate is twenty-four inches in length, and fastened to each tie with two spikes—and the rail secured to the plate by one or more W-bolts, and an iron yoke which holds the rail to an even surface and a straight line.

Int. 18. Do you know of any matter or thing of benefit to the plaintiff or defendants in this case not already set forth in your deposition? If so, please state it.

(Objected to by complainant.)

A. Nothing occurs to me now.

Cross-examined by the complainant:

Inty. 1. What machine did you use first, and for how long a time, to repair your rails?

A. I am not able to say. I think we have persons who could give the information.

Int. 2. What was the name of the machine used with clamping-jaws,

and by whom made, and how long a time was it used by your company?

915 A. I am not able to say. I couldn't say how long it was used by our company. I should think it was the largest part of the time while we mended rails.

Int. 3. Do you or not know that your company was sued by the complainant, in about the year 1865, for the use of this machine with clamping jaws, and is not that the main reason they discontinued repairing iron?

A. I did not know that they were sued by the complainant. I did hear that there was some question in regard to a machine used by the Fitchburg Railroad. I do not know that the question had anything to do with the discontinuing of mending rails.

Int. 4. When did you hear that the machine was first questioned?

A. I could not tell, as those matters do not always come to my knowledge, other officers of the road having charge of matters of this kind.

Int. 5. Do you know, of your own knowledge, what it cost the Fitchburg Railroad Company to regair their rails?

A. I have given the nearest estimate I can; taking the wages paid the men from the books, the average cost of material at the time.

Int. 6. What time do you intend to cover by the estimate you have stated, and the amount it cost the Fitchburg Road to repair rails?

A. The entire time.

Int. 7. Has there ever been any difference in the cost of repairing rails from 1852 to 1865?

A. It varied according to the market-price of labor and materials.

Int. 8. Did you intend to include the time from 1852 to 1865 in your answer to the sixth cross-interrogatory?

A. I mean to include all the time that rails were repaired. We did not try to see how cheap they could be done, but how well; which added somewhat to the expense they could be contracted for.

916 Int. 9. Has or not there been a great difference in the price of labor, coal, and iron within the years 1852 and 1865?

Ans. There has been a difference. I cannot say how much without referring to books.

Int. 10. At what distance did you figure to transport old iron on the track to make it cost two dollars per ton?

A. Twenty-five miles; that being twenty-five fifty-eighths (25.58) of the longest part of the road.

Int. 11. What is the cost of the chairs you use, or have described, for supporting the rail on the track?

A. It varies, according to the price of iron and coal; the lowest has been one dollar eighty-three cents ($1.83) per chair, according to my best recollection. I think the last cost about ten cents more.

Int. 12. What company is repairing iron at Fitchburg on the right-hand side of the track before you go into the depot at Fitchburg?

A. I think it must be the Boston, Clinton & Fitchburg. I have seen some rails being partially mended at that place within a few weeks, under charge of that road's master mechanic; the top the rail only being repaired.

(Signed) C. L. HEYWOOD.

CHARLES S. TURNER, having been first duly examined, cautioned, and sworn, deposes and says as follows, in answer to interrogatories put by S. M. Whipple, esq., for the defendants:

Q. 1. Please state your name, age, residence, and occupation.

A. My name is Charles S. Turner; age, 46 years; residence, Worcester, Mass., and am superintendant of the Worcester & Nashua Railroad, and have been for a little more than six years.

917 Q. 2. Did you find that said company was repairing rails at the time you came into their employ? If so, by what powers, or by the use of what mechanism?

A. I did. I found them repairing rails on an anvil or swedge-block, called "Cawood's." It is an anvil, or forms upon an anvil, upon which the rail can be placed to be hammered, the rails fitting into these different forms for convenience of hammering. The jaws which form a part of this form I was speaking of are worked with a crank backward and forward to and from the rail, as the workman would have occasion to use it in the process of welding, hammering, &c.

Q. 3. Have you seen what purports to be a certified copy of a swedge-block for mending railroad-rails, patented to Joseph D. Cawood, September 9th, 1856? If so, is the swage-block you are using substantially the same as that described in that patent, or is it different? If in any respect different, please state the difference.

(Objected to by complainant.)

A. I have seen a certified copy of that patent. The swedge-block we are using is substantially the same as that described in that patent. There is a slight difference, merely a housing over the cams in the patent instead of being exposed as in the one we use. There is nothing else different; the principle is the same.

Q. 4. How long, according to your knowledge, has your company used this block for mending rails?

A. Six years and a little more.

Q. 5. During that time, what, from your knowledge or estimate, is the average amount of patching done upon a rail, in lineal inches of weld?

(Objected to by complainant.)

A. I think it would average twelve inches.

918 Q. 6. Taking into account all the items that enter into the cost of repairing rails, what has it cost your company, and does it now cost, per lineal inch of weld?

(Objected to by complainant.)

A. Our estimate for welding is about ten cents an inch, exclusive of the cost of transportation each way to and from the shop.

Q. 7. What kind of rails do you use on your road?

A. We now use both the common T rail and fish-plate rail.

Q. 8. Are the two kinds of rails repaired on this Cawood swedge-block?

A. They are not by us, but only the T rail.

Q. 9. What disposal do you make of the fish-plate rail in case it needs repairing?

A. We should probably cut it off. We have not had occasion yet to mend.

Q. 10. Please give your reasons.

(Objected to by complainant.)

A. It would be so difficult fitting a rail by hand to use a fish-plate successfully.

Q. 11. What are the different lengths of rails used on your road, and the weight of the same per yard?

A. Lengths, 18, 21, and 24 feet—mostly 24; weight, from 56 to 58 pounds per yard.

Q. 12. What is the principal object with you in repairing T-rail iron?

A. To preserve the length principally.

Cross-examined by complainant:

C. Q. 1. Do you know, of your own knowledge, what it costs your company per inch to repair the rails?

A. I do.

C. Q. 2. Do you keep an account and measure the work daily in repairing rails?

A. No; not daily.

C. Q. 3. How do you keep it?

919 A. I get at the expense of welding rails from an average day's work of our men, when they have spent the whole day. Our men do other work, as we do but little of welding rails; therefore I made my calculations from what they would weld in a day, taking the actual time and material spent in doing it.

C. Q. 4. How long is your road, and how many rails do you repair in a year?

A. The road is forty-six miles long. I cannot say how many we repair in a year, as I did not expect to answer the question and did not inform myself.

C. Q. 5. How many different patterns or forms of T rail do you have on your road?

A. I will not answer that definitely, but should say two or three, perhaps three.

C. Q. 6. How many of these machines you speak of have you in use?

A. Only one.

C. Q. 7. Will the rails all fit in the jaws of that machine up to about the centre of the crown of the head perfectly?

A. My impression is that they would not perfectly.

C. Q. 8. How many men do you use in repairing rails?

A. Three work at it more or less; never more than three. We do very little at it.

Direct examination resumed:

Q. 1. Does, or not, the jaws of said machine fit the two or three different patterns of rails sufficiently well to hold them in the process of welding on the patch?

A. They do.

(Signed) C. S. TURNER.

MOSES F. WARREN, being first carefully examined and cau-
920 tioned, and sworn, deposes and says, in answer to interrogatories put by S. M. Whipple, esq., for the defendants, as follows:

Q. 1. Please state your name, age, residence, and occupation.

A. My name is Moses F. Warren; age, thirty-three years; residence, Rollingsford, N. H.; I am a blacksmith for the Boston and Maine Railroad Company.

Q. 2. Does said company repair rails; if so, where, and do such repairs come under your supervision?

A. They do, at Dover, New Hampshire. I have the charge of them.

Q. 3. How many men are working under you repairing rails at Dover?

A. Four.

Q. 4. What amount of work do these four men turn out per day, on an average, of mended rails?

A. They will average about forty-five ends of rails per day.

Q. 5. Have you kept an account of the cost of such a day's work, and have you a minute of the same with you? If so, please state in substance the result of the account as kept.

(Objected to by complainant.)

A. I have kept such an account. I have a minute of the same with me. One day's work mending rails, use—

Three hundred pounds of coal, at 90 cents	$2 70
30 lbs. iron, at 4 cents	1 20
2 men, at $2.00	4 00
2 men, at $1.75	3 50
Proportionate expense of running engine	60
Making a total of	$12 00

Ends mended, 40, making a cost of each end thirty cents, or about five cents per inch.

Q. 6. What kind of block or anvil do you use in repairing rails?

921 A. It is a common, straight swage-block, with grooves running along across the face to fit the side of the rail.

Q. 7. Have you ever used a block with jaws fitted to the sides of the rail and clamping the same as in a vice, to hold the rail while you are welding on the patch? If so, how were the jaws operated?

A. I have used such a block. The jaws were operated by a wedge dropping into a V-shaped block, and were worked by a foot-treadle.

Q. 8. How long since you worked on such block, and how long did you work on the same?

A. I think it is about three years since, as nigh as I can remember. I worked on it about two years, I think.

Q. 9. How much more work, if any, did you get out per day, with the same number of men, when you used said block, than you are now getting out with a plain block with grooves?

(Objected to by complainant.)

A. Not any more.

Q. 10. What kind of rails are brought to your shop for repairs?

A. The T-rail.

Cross-examined by complainant:

C. Int. 1. What width and thickness is the patch-iron that you use in repairing rails, and weight of same per foot?

A. We use $2\frac{1}{2}$ inches by $\frac{1}{2}$ inch thick; we use $2\frac{1}{2}$ by $\frac{3}{8}$; we use $2\frac{1}{4}$ by $\frac{1}{2}$, and $2\frac{1}{4}$ by $\frac{3}{8}$. I couldn't state exactly the weight per foot. I think the $2\frac{1}{2}$ by $\frac{3}{8}$ would weigh about three and a half pounds. The other would be about half a pound difference.

C. Int. 2. In this day's work that you speak of, you give in the iron as 30 pounds; how many feet would that patch in length, at three pounds and a half to the foot?

A. I can't tell that; some would be wasted.

922 C. Int. 3. Who made out this statement that you have produced here as to the cost of that day's work in mending rails?

A. I made it out.

C. Int. 4. Please look at that and state if that is in your handwriting; and, if not, in whose handwriting is it?

A. No, sir; it is not in mine. I don't know in whose handwriting it is.

C. Int. 5. Do you cut off rails at your shop when no patching is done to them?

A. Yes, sir.

C. Int. 6. How many rails were cut in this day's work when forty ends were mended?

A. There was none.

C. Int. 7. How many inches in length was put on each end at the time you mended forty ends in this day's work?

A. Three to six inches; some probably only a small shim or wedge put in.

C. Int. 8. Do you, or not, know the reason why your road discontinued using the machine with jaws you have spoken of?

A. I do not; except that they didn't like them.

C. Int. 9. Were those machines made so that the jaws fitted the rail, coming up about to the centre of the crown or head of the rails?

A. They were.

C. Int. 10. How many different pattern rails did you repair in the same machine?

A. Only one kind.

C. Int. 11. What kind was that, and were they all of the same height and shape?

A. They were a T-rail, of the same height and shape.

C. Int. 12. Did you ever hear that the Boston & Maine Railroad had been sued for using the blocks you have spoken of in repairing rails?

A. I did.

C. Int. 13. How long ago did you hear of it?

A. I think it was a year ago; somewhere there.

923 C. Int. 14. Who handed or gave you this piece of paper with the statement on it you have testified to as to this day's work?

A. Mr. Whipple.

C. Int. 15. How long since?

A. Perhaps an hour.

Direct examination resumed:

Dir. res. Are the statements in said paper referred to in the 14th cross interrogatory true, of your own knowledge?

A. Yes, sir.

(Signed) MOSES F. WARREN.

MOSES W. OLIVER, having been first carefully and duly examined and cautioned and sworn, deposes and says as follows, in answer to interrogatories put by S. M. Whipple, esq., for the defendants:

Int. 1. Please state your name, age, residence, and occupation.

A. My name is Moses W. Oliver; age, forty-nine years; residence, Nashua, N. H., and I am a civil engineer.

Int. 2. By what company are you employed as civil engineer?

A. By the Boston & Lowell Railroad, and the Lowell & Nashua Railroad, and all the railroads that they operate.

Int. 3. Does the matter of mending railroad-rails come under your supervision as civil engineer of said companies?

A. It does.

Int. 4. To what extent do your companies repair iron?

A. From ten to twelve hundred tons per year.

Int. 5. What are the means or appliances used for repairing iron?

A. The ordinary hand-tools called a swage-block for a former, and an ordinary hammer, with blacksmith appliances, with a traveling block to handle the rail.

Int. 6. At how many points on your roads do you repair rails, and how many fires do you run?

924 A. We repair at four different points and four fires. Three of the fires run all the time, and the fourth from four to six months of th year.

Int. 7. Do you fish the joints of your rails?

A. We do. I should say that it is our practice, and has been for ten years, in all removals of iron.

Int. 8. Are you in the habit of keeping an account of the cost of repairing rails per inch or lineal foot, or in any other way? If so, what conclusion have you arrived at on this point?

(Objected to by complainant.)

A. I am in the habit of keeping an account of the number of rails mended. We have the usual manner of keeping laborers' account. I have not been in the habit of keeping an account of the iron and coal used so specifically. The conclusion I came to from the data that I have is, that the mending of our rails will not exceed fifty-five cents per lineal foot for the part of the rail mended.

Int. 9. How many patches or welds do you put upon a rail?

A. From one to three. I consider that we average more than two—a fraction. We may possibly put four upon some, but it is extremely seldom.

Int. 10. What is the average amount per rail of welding, in lineal inches or feet?

A. I consider it about two and a quarter feet, as near as can be determined by general and frequent observation.

Cross-examined by complainant:

C. Int. 1. Do you know of your own knowledge what it costs your company to repair their rails per inch or foot; and do they keep an account of the same?

A. My knowledge comes to me officially of the amount of labor done on the roads. It is such an account or memorandum as I order to be kept and returned to me. I do not know that the company in their accounts keep a separate account of the cost of mending rails.

925

C. Int. 2. Then all you know about it is from an estimation you have made yourself, as to mending rails?

A. What I know about is the cost of labor, from making out the payrolls, and the amount of work done. I know from an equally reliable source the amount of materials of iron and coal. My estimate is made from my estimate of the quantity used upon a rail and general knowledge of the amount of coal used in a year.

C. Int. 3. How much iron do you estimate for a foot of patching?

A. Five pounds, or rather less than five pounds.

C. Int. 4. How do you figure out *of* your estimate of fifty-five cents per foot?

A. I estimate it cost us one dollar and twenty cents per rail, and the amount of patching as two and a quarter feet per rail. That does not make quite fifty-five cents per lineal foot.

C. Int. 5. How do you know the rails average two and a quarter feet per rail?

A. By frequent observation and measurement. Of course I cannot measure every one.

C. Int. 6. Do you or the company keep any measurement of the amount of patching that is done on the rails?

A. I do not keep any written record, nor do the company keep any record of the lineal feet of patching. I have a very satisfactory idea of the amount of it myself.

C. Int. 7. How much coal does it take to repair a rail or a foot of iron?

A. Well, it takes, I should say, from twenty to twenty-four pounds to repair a rail, and eight to ten pounds for a foot.

C. Int. 8. What does the coal cost per ton?

A. About eight dollars.

926 C. Int. 9. How many men are employed at each fire, and the wages of the same per day?

A. Three men are employed at each fire. One man has $2.12½ per day, the other two $1.65 per day each.

C. Int. 10. What does your iron cost per pound?

A. It costs the market-price. We buy it at retail.

C. Int. 11. What has it cost the last year?

A. I couldn't recollect exactly. All the way from a little less than three , and I don't know as we have paid over four , until very recently.

C. Int. 12. How long has your company repaired rails on their road?

A. I don't know as I can tell. I know for five years.

C. Int. 13. How much do you allow to be mended on a single rail?

A. No definite orders about it. It is left to the judgment of the men, depending on the quality of the rest of the rail.

C. Int. 14. What kind or form of rail do you use?

A. The common T-rail pattern, 3½ inches high, 4 inches bottom.

C. Int. 15. When did you make out this estimate you have testified to, as to cost of mending rails?

A. The item of labor I have been in the habit of noting from my memorandum for three or four years. I have occasionally estimated the amount of iron. Finally, I put the statement I have given you now together to-day.

C. Int. 16. Then all you know about this account is by estimation?

A. No; it is not.

C. Int. 17. How do you know that the repairing done on your rails will average two feet and a quarter per rail?

A. Sufficient observations and measurements to satisfy me of the truth of it.

C. Int. 18. About how many rails have you measured in the last four years, that have been repaired?

927 A. I have measured, according to my best recollection, from half a dozen to a dozen times, and of a pile of mended rails, of fifty rails, perhaps I have measured half a dozen places to note the general average.

C. Int. 19. Why do you patch your rails to that extent, that they will average two feet and a quarter to a rail?

A. It is a custom we have got into—seeming to be economical to do so.

C. Int. 20. Do you find it economical to patch your rails to that extent?

A. I can't say positively. I have not absolutely gone into comparisons with the cost of new iron, and it would be very difficult to do so, as the average time a mended rail will last is unknown.

(Signed) M. W. OLIVER.

MAY 1, 1872.

WILLIAM H. RUSSELL, having been first carefully examined, cautioned, and sworn, deposes and says as follows, in anwer to interrogatories put by S. M. Whipple, esq., for the defendants:

Q. 1. Please state your name, age, residence, and occupation.

A. My name is William H. Russell; age, fifty-three years; residence, West Springfield, Mass.; have been civil engineer for the last thirty-four years, and am now and have been for the last three years general

road master of the Boston & Albany Railroad. Previous to that three years, I was division road-master for twelve years for the branch of the road from Pittsfield to Albany, fifty miles.

Q. 2. What are your duties as general road-master of the Boston & Albany road?

A. I furnish supplies for repairs of track. I have four assistants, who operate under me, in keeping up the track.

928 Q. 3. Have you the general supervision of all matters connected with keeping up the track, such as purchasing ties, iron, spikes, etc., and the distribution of the same in different parts of the road?

(Objected to by complainant.)

A. I have.

Q. 4. In keeping up the track, what disposal do you make of the iron when it becomes unfit for further use, in consequence of becoming battered or laminated by use?

(Objected to by complainant.)

A. If the rail is broken in different parts, we throw it away, to have it rolled again. If it is merely broken at an end a short piece, in former years we used to weld it some. We have welded some for the last two or three years, but, as a general thing, we cut it off, and use what part we can.

Q. 5. Have you, or not, entirely discontinued the practice of mending iron?

(Objected to by complainants.)

A. We have given up all our shops to that effect, at Albany, Springfield, and Framingham.

Q. 6. When you did repair iron, what kind of tools did you use for the purpose of your different shops?

A. At Springfield and Albany we used nothing more than the anvil. At Framingham—I don't know what they called it—we used jaws for holding the rail.

Q. 7. What reason, if any, have you for discontinuing the practice of repairing rails?

(Objected to by complainants.)

A. I thought it wasn't economy to do so. Taking the rails out of the tracks and sending them off to the shop, which, in our divisions, would average twenty-five miles—and after they were welded, they did not last a great while; they generally broke down near the weld.

929 The rest of the rail would generally be pretty good, and we concluded it would be best to cut it off without welding, and get what use we could out of the rail without welding, and then have to cut it off in the end. We have so many different lengths of iron now that we can get lengths to match almost anything. On our side-tracks we cut them down to fifteen feet. We have all lengths, from eighteen to twenty-eight feet, that is, as we get it rolled. In the winter time, when we get short of iron, as we did this winter, the ground being frozen, we cut so as to hit the ties. We take out the larger rails and cut in the shorter pieces—shorter than fifteen feet, I mean. In fact, we have all lengths in the track, from three feet to twenty-eight. The shortest we put in anywhere it happens, very often to make a connection, wherever it may come. It is not always next to a frog.

Q. 8. At what place do you cut your iron, and do you cut it hot or cold?

(Objected to.)

A. We cut it right on the road, and we cut it cold.

Q. 9. What does it cost on an average to do this work per cut, as above stated?

(Objected to by complainant.)

A. Somewhere from five to ten cents, probably.

Q. 10. What disposal do you make of the part cut off?

(Objected to.)

A. We send it to the rolling-mill to be rolled over. We sell some. We have sold several hundred tons this spring.

930 Q. 11. What sum per ton have your company been paying for the last two years for iron returned from rolling-mills when they have received the scrap on the company's line and returned it without charge of transportation?

(Objected to by complainant.)

A. Our lowest price, twenty-seven dollars; the highest, thirty-five.

Q. 12. What price does the company receive for rails when they become unfit for further use.

(Objected to by complainant.)

A. We sold this spring two hundred tons for fifty dollars per ton, and five hundred tons for fifty-five dollars.

Q. 13. What have you been paying for new iron?

A. I don't know what we have. I have forgotten. I have the bill at home. We hav'n't bought any new iron in America since I have been on the car-committee. Over's is English iron. We have it rolled here.

Q. 14. For a hundred tons of iron made up of pieces cut off from rails and sent to the rolling-mill, how many tons of new iron will the rolling-mill return to you for it?

(Objected to by complainants.)

A. They return the same weight, and we pay for rerolling the price already stated.

Q. 15. What would be the cost, as near as you can estimate it, of transporting rails, per ton, to and from the shop for repairs?

(Objected to by complainants.)

A. I should say about a dollar a ton each way.

Q. 16. How many of your 28-feet rails will it take to make a ton, and how many of your 18-feet rails?

A. About four of the 28-feet rails and about six of the 18-feet.

931 Q. 17. What of two things have you to do when a rail becomes unfit for future use in the track by imperfections in order to avail yourself of that part of the rail which is not damaged?

(Objected to by complainants.)

A. We cut off the damaged part, if the length of the rail will answer for any purpose we may wish to use it for.

Q. 18. What other course could you pursue?

A. In former times we welded some.

Q. 19. What advantage, if any, do you gain by welding instead of cutting the rail?

(Objected to by complainant.)

A. I don't know as any advantage, except preserving the length.

Q. 20. Does the mere welding a patch of six or more inches on a rail add anything to the value of that portion of the rail which is not damaged, other than to preserve its length?

(Objected to by complainant.)

A. I should say it did not.

Q. 21. What sum, if any, in your judgment, could your company afford to pay for repairing rails over and above the cost of transportation of the rails to and from the shop for repairs?

(Objected to by complainants.)

A. I should say they couldn't afford to pay anything. If you cut off all the part injured, and throw it away for scrap, to weld those same pieces wouldn't pay for the transportation of the rail to the shop to be repaired.

Q. 22. Is the good part of the rail which remains after cut'ing off the injured part a better rail, in your judgment, or not, than the same rail would be if taken to the shop and repaired for the purpose, as you say, of preserving its length?

(Objected to by complainant.)

932 A. Well, I should say I don't know why it shouldn't be better. In welding, by being heated, or something, five-sixths of them break off right down at the weld. That has been my experience of them.

Cross-examination by the complainant:

C. Int. 1. For how many years has the Boston & Albany Railroad repaired iron, and when did they commence doing the same; or, before consolidation, the Western Railroad and the Boston & Western Railroad?

A. I don't know when they commenced. They have been doing it ever since I have been connected with the road, although they have been reducing it the last four or five years.

C. Int. 2. How much do you lose in length of rails by cutting them off?

A. That depends on the place where they want to put them. They cut them to match some other rail, one foot or three feet.

C. Int. 3. Where do you get your iron rerolled?

A. At Worcester, Troy & P'œnix Iron Co.'s; at Philadelphia for the last four or five years.

C. Int. 4. Who pays the transportation of scrap-iron and rerolled rails over the line of your road?

A. At Troy, we deliver at Troy. We pay the freight, of course. At Phil'delphia, for the last two years, they take it at and return new to Hudson. Worcester being on the line of our road, of course we carry the iron to and from.

C. Int. 5. What distance do you have to transport scrap-iron, and new iron in return over the line of your road?

A. At Philadelphia and Troy, it would probably average fifty miles. The average at Worcester would be, say, twenty-five miles.

C. Int. 6. Do you know, of your own knowledge, what your company pay for rerolling?

A. I do; I audit all the bills.

933 C. Int. 7. What did it cost them to get their iron rerolled, from 1860 to 1870, or about what was the price per ton?

A. I don't recollect. But at Philadelphia I think it was twenty-eight dollars about that time.

C. Int. 8. Wasn't it any higher than that during the war?

A. I think it was higher. I don't recollect whether we had any at Philadelphia at that time. I think at Troy we paid as high as thirty-five dollars. That is the highest we ever paid. I think at Philadelphia we paid them twenty-eight dollars, and we paid the freight—two dollars and a half each way—which would make it thirty-three dollars. For the last two years we have paid no freight from Hudson to Philadelphia, or Philadelphia to Hudson.

C. Int. 9. Would, or not, the ends of the rail, when properly patched, wear as long or longer than the balance of the rails?

A. Yes; I think it would. I breaks down so near the patch, that of course, it gives out before the patch wears out.

C. Int. 10. What causes the rail to give out near the place patched sooner than any other portion of the same rail?

A. I don't know, unless it is caused by the heating of it.

W. H. RUSSELL.

HORACE A. ALDEN, being first carefully examined, and cautioned, and sworn, deposes and says as follows, in answer to interrogatories put by S. M. Whipple, esq., for the defendants.

Int. 1. State your name, age, residence, and occupation?

A. My name is Horace A. Alden; age, forty years; residence,
934 Londenville, Vermont; and master mechanic of the Connecticut & Passumpsic River and Massawippi Valley Railroad, commonly known by the name of the Passumpsic Railroad, and have been employed on the road a little over twenty years, and about twelve or fourteen years as master mechanic.

Int. 2. Do you repair railroad-rails, and if so, to what extent, during the twelve years you have been master mechanic?

A. We do. We first commenced with one fire—at the present time we have three in operation.

Int. 3. What machines or appliances do you use in repairing rails?

A. We use the common anvil, the swage-block with movable jaws; I believe known as the Beebe & Smith block. Then we have another block with grooves to fit the rail when repairing the web, bottom side up. We use suitable hammers, fullers, and swagers and flatters.

Int. 4. How many Beebe & Smith blocks are you using?

A. Three, now.

Int. 5. What does it cost your company per rail, to repair their iron, or in any other way in which you keep it?

(Objected to by complainant.)

A. At the time that we kept the account, it figured up about a dollar per rail, a few cents short of a dollar. I think it was a year ago last summer we kept that account.

Int. 6. How many rails do you get out per day, per fire, on the Beebe & Smith block on an average?

A. It depends very much on the men and the condition of the rail to be repaired. About ten rails we consider a very good day's work.

935 Int. 7. From the experience you have had in repairing rails, what conclusion have you arrived at, as to the economy of repairing rails at all?

(Objected to by complainant.)

A. I should abandon it.

Int. 8. Will you please give one or more reasons for abandoning it?

(Objected to by complainant.)

A. I don't think we save enough in the length of the iron to warrant the expense. In that expense I should include from the taking out from the track to getting the rail back there again.

Int. 9. Are you adopting the method of cutting off the bruised or laminated part in the place of taking the rail to the shop for repairs? If so, what does it cost, in your judgment, to make such cut?

(Objected to by complainant.)

A. We are not adopting that practice to any extent. The expense of a cut is a matter I have never investigated. To give my opinion, it would be from ten to twenty cents.

Int. 10. Do you intend to adopt the cutting of rails in the place of repairing the same?

(Objected to by complainant.)

A. I strongly recommend it, but it remains with our president and superintendent to decide that question.

Cross-examined by complainant:

C. Int. 1. Which costs the most, if any difference, to take a rail out of the track and take it to the shop to be repaired, and return it again to the track, or taking a rail out to be sent to the rolling-mill and replacing it with a new rail?

936 A. There are two points there to be taken into consideration. If you take a rail out, take it to the shop and repair it and return it to the track again and you have an old rail still. If you send it to the rolling-mill, and return it to the track you have a new rail. If you mean to ask merely as to the cost of transportation, that depends upon where you send the rail—the distance you send it—of course.

C. Int. 2. Would the expense of transportation of rails taken out of a track and repaired and returned again be the same as rails taken out and sent to a rolling-mill and new iron returned, supposing in each case an equal distance, and the the transportation in each case being on your own road?

A. I can't see any difference.

HORACE A. ALDEN.

WILLIAM MULLEN, being first carefully examined and cautioned and sworn, deposes and says as follows, in answer to interrogatories put by S. M. Whipple, esq., for defendants.

Int. 1. State your name, age, residence, and occupation.

A. My name is William Mullen; age, thirty-one years; residence, St. Albans, Vermont, and I am rail-repairer on the Vermont Central Railroad. I commenced repairing rails for that company in 1857, and have continued it ever since.

Int. 2. During that time what kind of blocks and other tools have you used in repairing railroad-rails?

(Objected to by complainant.)

A. The first was a square block with a swage on each side, like the model marked "St. Albans block," excepting that there were no
937 jaws in it. After that we used a block similar to that model, with a swage on one side without the jaws. The next was the jaws, then worked with a lever. These jaws came down like an A with the point down, set in what we called a saddle bolted on to the original anvil. Then the next we used was the block, the model "St. Alban's block."

Int. 3. Please state how you repair iron in the block last named.

(Objected to by complainant.)

A. Supposing the end of the rail wanted a patch, after it is hot we place it on the face of the anvil and fit it for a patch; then we heat it and weld the patch on where it is on the face of the anvil. After it is welded, we turn it into one of the swages and full it up; then we upset the end; then we put in what we call the jaws and finish the surface of it there.

Int. 4. While the rail is in the jaws to be finished on the top, does the bottom of the rail rest on the anvil?

(Objected to by complainant.)

A. No, sir.

Int. 5. By hammering on the top with sledges for dressing off, does it drive the head down into the jaws, or preserve it in shape, as when it went into the jaws?

A. I couldn't say exactly for that; not exactly; it doesn't drive the head into the jaws. I couldn't say exactly whether hammering on the top altered the shape. I couldn't say whether it kept the exact shape or not.

Int. 6. Do you use fish-plates upon the rails which you repair in that block?

A. No; we do not repair any fish-plate iron in the jaws.

938 Int. 7. Would it or not be detrimental in dressing off the rail in the jaws if the bottom rested on the anvil underneath?

(Objected to by complainant.).

A. I think it would be injurious to the rail.

Int. 8. How long did you work on the block with moveable jaws moved by a lever the same that you have already described, and how long did you work on the block used before the lever-block?

A. About four years on the lever-block, and four or five years, I guess, on the one before that.

Int. 9. How long have you worked on the block like model "St. Alban's block?"

A. About a year.

Int. 10. On which of the three blocks named can you do the most work?

(Objected to by complainant.)

A. I don't know as there is any difference as to most work. I can do the best work on the last block.

Int. 11. Did you do as much work and as good work on the first block as you did on the second or jaw-lever block?

(Objected to by complainant.)

A. I think we did.

Int. 12. Do you repair what is called the high fish-plate iron on your road?

A. Yes, sir; we repair the fish-plate rail on our division.

Int. 13. Please look at defendant's model, marked "Fish-plate Rail," and say whether it is a correct representation of the rail used on your line and repaired by you.

A. No, sir; I don't think that is exactly.

Int. 14. Wherein does it differ; is it or not the same in height?

A. It is the same in height. The corners on the under side of the tread are rounding in the model, whereas they should be square.

939 Int. 15. Please describe the manner in which you repair the high iron represented in the model, without the use of fixed or movable jaws?

(Objected to by complainant.)

A. Suppose we want to patch an end of a rail—as "fish-plate rail No. 2"—we fit it for a patch, then we weld it on; then we turn it down right on to the anvil, full it up, square the end; then we have splices, like those on model "fish-plate No. 3." We slide those splices in and swage it down and finish it off, as seen in models fish-plate Nos. 2 and 3 when put together.

Cross-examined by the complainant:

C. Int. 1. How many machines are used on the Vermont Central Railroad for repairing iron?

A. I don't know.

Int. 2. How many like blocks marked "St. Albans block?"

A. Four.

C. Int. 3. Why did they attach the jaws stationary in that block, and what was the object of having them?

A. Because the rail would line in the swage-block the jaws.

C. Int. 4. Are they of any benefit in the work of repairing rails?

A. I think they are.

C. Int. 5. About how many rails does the Vermont Central Railroad repair in a year?

A. I don't know, sir.

C. Int. 6. How many fires do they run at the St. Albans shop?

A. Four.

C. Int. 7. Who got up this block marked St. Albans, and why was it substituted for the block in which the jaws worked with a lever?

A. I don't know as I can answer that question.

940 C. Int. 8. How many blocks like that marked St. Albans are in use at the shop in St. Albans?

A. Four.

C. Int. 9. Do all four fires run steady every day through the year, since you have been there?

A. Not every day; we do a good deal of work out of doors. We have to straighten our rails now. It takes about two days a month to a fire.

C. Int. 10. Does your road keep any account of repairing of rails in feet or inches, and have they during the time you have been repairing rails?

A. None, except two days in our shop.

C. Int. 11. Do the rails repaired give good service in the track?

A. It is my opinion that they do.

WM. MULLEN.

DAVID HASSETT, being first carefully examined and cautioned and sworn, deposes and says as follows in answer to interrogatories put by S. M. Whipple, esq., for the defendants:

Int. 1. State your name, age, residence, and occupation.

A. My name is David Hassett; age, thirty-six years; residence, Northfield, Vermont; and am foreman of a rail-shop at Northfield, of the Vermont Central Railroad. I have been foreman fourteen years, and have been in the shop seventeen years.

Int. 2. During the fourteen years you have been foreman, what kind of blocks have been used at your shop for repairing rails?

A. The first that we worked with were what we called "lows." They were a square block with four legs of iron. There was a plain,

941 smooth block in the middle, a swage upon each side, and a double swage on some of them. I think the single swage is better. The next that I used was the Cawood block, patented September 9, 1856. That was what was on the block. After that, we used a block called the Beebe & Smith patent. If I recollect right, that had a double swage block; there were two jaws, split in the middle, which were V-shaped and worked by a lever. It was a very light casting. I should think it might be between five and six inches thick. I used that a while. I was the first person to use it on the road. We had it fitted on to some heavy timber underneath, and it used to get so hot that it set fire to the wooden block under it to support it. E. F. Perkins was master mechanic at that time. Then we returned in our shop to the old original low.

Int. 3. How many Beebe & Smith blocks have been in use at any time on the Vermont Central Railroad, and are any of them in use at the present time?

A. I couldn't tell that. I don't know anything about any other shop. We had four of them when we started using them, but have none now.

Int. 4. How many Cawood blocks?

A. I never saw but one.

Int. 5. Of all the different blocks you have used at your shop, on which, if any, can you do the most and best work?

(Objected to by complainant.)

A. I think we can do full as much on the plain block—the old "low."

Int. 6. Do you mend the fish-plate rail, such as is represented in the "fish-plate" model, on the old low?

A. I should judge that we had welded at least two thousand of them within the last six months at our shop alone.

942 Int. 7. How do you manage to preserve the neck in the process of welding, so that the fish-plate will fit the neck when the rail is returned to the track?

(Objected to by complainant.)

A. The way we always managed until I went to St. Albans, was, we put on the patch first, took a fuller and raised the heel of the patch a very little; then we take our finishing heat; after we get through welding turn the rail down sideways, then take a sharp chisel, commencing at the heal, and turn right out to the front part. It can be done in an instant. We try the strap of fish-plates in the shop to the mended rail to see if they fit. We also see that the holes in the straps and in the neck of the rail correspond.

Int. 8. Have you, at your shop, adopted the method of finishing the top of the rail in the fish-plates or straps the same as described by Mr. Mullen?

(Objected to by complainant.)

A. Yes, sir; three of the fires do; the fourth does not. We never could get him to u e the jaws, and he is considered as good a welder as we have got, and does as much work.

Cross-examined by complainant:

C. Int. 1. How many different patterns or forms of rail have you on your road?

A. I suppose we might call them all T-rails. There is the Bay State and the Worcester rail. I don't know as there is any difference in the pattern. There is another pattern called the Jersey iron, something similar to the fish-plate.

C. Int. 2. When did your road discontinue the use of the Beebe & Smith machines, and for what cause?

943 A. I don't know. I was never notified to discontinue them. Our boys throwed them out because they were in their way. I don't think they have used any in our shop for a year, and they haven't used them but very little since P. G. Stone gave up the charge of the rail shops. That must be as much as six or seven years since he died. Those jaws have been there since, until about a year ago.

C. Int. 3. Is that the only reason they threw them out—because they were in the way?

A. I know of no other reason. They were in the way in welding fish-plate iron. We have had a great deal of high fish-plate iron during the year to mend, and we couldn't use those jaws in doing it.

C. Int. 4. Were the jaws in the Beebe & Smith machines adapted to fit the T-rails, properly coming up to about the centre of the crown of the head?

A. Sometimes they would, and sometimes they wouldn't. If there

should happen to be more stock on one side of your rail than on the other, it would throw one jaw up a little more than the other, so that they would come crooked; consequently they would twist the rail, and the worst thing you can do to a rail is to twist it.

C. Int. 5. Then, was it on account of the jaws not fitting the rail that you found so much difficulty in mending with that machine?

A. Well, the most difficulty I ever found with it was in warping the ends of rails and cracking the necks. If the neck is any way weak, they are apt to crack them.

C. Int. 6. If the jaws in the machine had fitted the rail properly, coming up to the center of the crown of the rail, would the rail then crack in repairing it?

A. If it was a good sound rail, I don't think it would.

944 C. Int. 7. How many fires have you in operation at Northfield, in that shop, since you have had charge of it, and how many are there at the present time?

A. There are four at the present time. In the summer-time, we generally run two and three. We have run eight fires two or three months this winter, and for two or three winters before. We use the same tools. We do not have extra tools when we do that, but run night and day.

C. Int. 8. Has your road done an extensive business in the way of repairing rails, and do the rails give good service on the track after being repaired?

A. They have done considerable at it. They have had good many fires running, and have had to in order to keep up the rails, owing to the increase of business. I have heard no fault found with the rails repaired. We don't have to repair twice in the same place very often.

C. Int. 9. How many shops or fires are in operation and have been since you have had the charge at Northfield?

A. That is something I couldn't tell. I know nothing about any other shop but my own.

C. Int. 10. Do you ever split the neck in the high fish-rail in repairing it or in punching the holes?

A. Never, without it was split before it came into the shop; sometimes they are split, and it is impossible to weld them.

D. HASSETT.

Circuit court United States, district of Illinois.

SAMUEL H. TURRILL
vs.
ILLINOIS CENTRAL R. R. CO. ET ALS.

I hereby certify that the foregoing are true copies of the depositions taken before me by the defendants, to be used on the trial of the above-entitled cause, on the 30th day of April and 1st day of May, A. D. 1872.

ELIAS MERWIN,
U. S. Commissioner for District of Massachusetts.

945 Deposition of JOSEPH R. CONRAD, taken May 24, 1872, before Charles H. Robinson, U. S. commissioner, Cleveland, Ohio:

Int. 1. What is your name, age, residence, and occupation?

A. My name is Joseph R. Conrad; am about 46 years of age; reside at Atwater, Portage County, Ohio; my occupation now is coal-mining.

Int. 2. What has been your occupation prior to being engaged in coal-mining?

A. I was roadmaster of the Cleveland and Pittsburg Railroad for 20 years last past until the 1st of January, 1872.

Int. 3. What were your duties as roadmaster of said road?

A. I had charge of the construction and repairs of the track, and keeping up the track generally.

Int. 4. Did you have anything to do in purchasing iron for the track, or, in other words, providing iron when any part of the iron in the track failed? If so, to what extent?

A. I made the estimates for the amount of iron we would require a year in advance of the wants of the road. Then the president of the road would make arrangements with the rolling-mills for the amount of iron required, either by purchase or rerolling. Then I had charge of the matter so far as the quantity and time of getting out was concerned.

Int. 5. You speak of rerolling iron; from what material was such iron rerolled?

A. From the old rail taken out; worn-out rail, pieces of scraps that would accumulate on the line of the road.

Int. 6. You say for about twenty years that you were roadmaster of the Cleveland and Pittsburgh Railroad to the 1st of January, 1872. About how long after you were first so employed did railroad rails begin to fail, so as to be of no further use in the track?

946 A. I should say that some of the rails began to fail in two or three years after they were first laid down.

Int. 7. What portion of the rail as a general rule failed first?

A. The ends of the rails.

Int. 8. When the ends of the rails had so failed as to be unfit for further use in that condition, what were you obliged to do to get further service from the material in the rail?

A. Well, we were obliged to either cut off the damaged part or repair the damaged part, or have the rail rerolled.

Int. 9. Which of these three resorts did you adopt, if any, or all of them? Please explain fully.

(Objected to by Mr. Turrill.)

A. Well, we adopted all of them; that is, practiced all of them. About that time repairing seemed to be practiced by many of the roads, repairing the ends, and we adopted that mode of reclaiming the rails; practiced that perhaps for some four or five years. We abandoned it after four or five years' trial. We then adopted the mode of cutting off the ends of the rails, the damaged portion, and replacing the balance of the rail in the track again. We generally found that this once cutting was always sufficient; that by the time any portion of the rail gave away, after that it would be about all unfit for use. We then take it out and send it to the mill, and have it reworked, rerolled.

Q. 10. In repairing rails what kind of tools or machinery did you use for the purpose?

A. We used clamps and small furnaces. I could not say whose clamps they were; that is, whose make they were. They were in common use; the same as they used on the Lake Shore at that time.

Q. 11. At what time or year do you speak of?

947 A. When we were using them it was somewhere along the years 1854 and 1859; somewhere along there.

Q. 12. Was it or not about the year 1859 that you abandoned entirely the repairing of rails?

A. It was about that time. I wouldn't state within a year, perhaps. Somewhere along 1858 and 1860.

Q. 13. When you repaired rails, what, in your judgment, did it cost the company per rail, including cost of labor and materials?

(Objected to.)

A. It is my recollection that it cost somewhere between 50 to 60 cents per end, but I wouldn't be positive. Had exact figures then, but have not now.

Q. 14. Whatever sum it cost, whether it be more or less than the sum stated, did the sum so expended on a railadd any value to that part of the rail not damaged?

(Objected to.)

A. I came to the conclusion that it did not.

Q. 15. What was the average length of a rail as used on that road at the time you were repairing rails?

A. Well, 18 feet was the maximum length. We had some rails 15 feet, but the average would not fall much below 18 feet. Probably nine-tenths of the rails were 18 feet.

Q. 16. About what amount of patching, in lineal inches, did you put, on an average, upon a rail, according to your best judgment?

A. I would say from—probably the average would be a foot—about 12 inches; we patched both ends sometimes, and patches were generally 6 to 9 inches long.

Q. 17. Then, if I understand this matter of patching rails, whatever sum was expended on a rail, that sum was expended for the purpose of preserving the length of the rail, to the amount of the patch, and
948 no more. Am I or not right in the statement, according to your observation and experience in the matter?

(Objected to.)

A. I should say you were right.

Q. 18. What, in your judgment, did it cost the company per cent. to remove the broken or laminated part of the rail, when cut cold upon the track?

(Objected to.)

A. Should say it cost about five cents a cut—that I should say would be the maximum, too.

Q. 19. What disposal did you make of the rails so cut?

A. We would preserve the damaged portion for scrap, and replace the good portion back upon the track.

Q. 20. What was the damaged portion so preserved for scrap worth per ton in the purchase of new rails?

(Objected to.)

A. It was worth just as much as the same weight of new rail—less the amount of rerolling. The price of new rails has fluctuated since that time (in the price of new rails) probably from forty dollars to a hundred dollars per ton—higher during the war; price of rerolling has fluctuated from fifteen to thirty dollars per ton—perhaps higher; don't just remember now.

Q. 21. What was the average price of rerolling, as near as you can judge?

(Objected to.)

A. I should say twenty-five dollars a ton as the average.

Q. 22. How many 18-feet rails would it take to make a ton?

A. Well, it would take nearly six—it would take over six—40 pounds more.

Q. 23. Setting aside the cutting of rails, what would it cost per rail to reroll it at twenty-five dollars per ton?

(Objected to.)

A. It would cost about four dollars per rail.

949 Q. 24. What, in your judgment, on an average, would it cost to take a rail to the shop for repairs and return it to the track, you having already stated that the patching was about a foot on a rail, reckoning material and labor only in repairing, not including transportation?

(Objected to.)

A. (That is, you mean the cost of carrying.) I should think it would be about a dollar per rail. I stated before that it would cost about 50 or 60 cents on end.

Q. 25. When a rail becomes damaged for ten or twelve inches, more or less, how much do you remove from that rail by cutting, as a general rule?

A. We would remove two or three inches more than the damaged part so as to get where the rail was sound.

Q. 26. And this you would be understood, would you, costs, on an average, about five cents a cut?

(Objected to.)

A. Yes, sir.

Q. 27. Have you compared the value of a rail that has been repaired with one that has been cut? If you have, please state with what results.

(Objected to.)

A. I have, that is, compared the value of the different rails. My observation has been that the cut rail is of more value than the repaired one. The cut rail, as a general thing, will wear more uniformly from end to end after it has been cut and is a more sound rail; while the repaired rail, it has been my observation, is apt to break at or near the junction of the weld with the old rail, and the repaired portion would never ride as smooth as the other portion of the rail and would cause a tremor or jar to the machinery and the cars. I also found that the majority of the broken rails caused by the running of the trains were

950 rails that had been repaired; this was another reason that I had for abandoning the practice.

Q. 28. Was this abandoning of the practice of repairing rails brought before the officers of the road, and was action taken therein? If so, please explain in reference to the matter of giving up the repairing of rails.

(Objected to.)

A. Yes. I had stated my conclusions to the president, who was also the general superintendent of the road. I don't know that any action was taken by the officers of the road, only the president told me I might use my own judgment in the matter. He was the only person who had any authority in the matter.

Q. 29. Having received such authority what action did you take in the premises?

(Objected to.)

A. I immediately abandoned the welding of rails and repairing them in that manner.

Q. 30. Please state your reasons in brief for so doing.

(Objected to.)

A. In the first place, there was no economy in repairing the rails, for it only renewed that portion that was repaired, which was worth far less

and cost more than the same amount of new rail could be purchased for.

Secondly. I became afraid of the rails, afraid some accident might happen from the use of them, as I found that a majority of the rails found broken by the running of the trains were rails that had been repaired.

Q. Which rail, in your judgment, is the more valuable for service, a rail that has been tested by use in the track, and the end found to fail, the rail with the failed part cut off and restored to the track, or
951 a new rail from the rolling-mill with the difference that one rail is as much shorter than the other as the part cut off?

(Objected to.)

A. It would depend on circumstances. That would depend upon the amount of wear there had been upon the rail that had had the end cut off. The rail, not having received much wear, merely giving out at the end, I would rather trust it than a new rail from the mill. It sometimes happens that the ends of rails are not as good as the other portion of the rail. It is caused by the rolling and the economizing too much in the amount of iron used to make the rail, while the balance of the rail might be of very excellent iron, and, having been proven, I should rather trust it than a new rail. The reason why the ends of the rails are sometimes not as good as the rest of the rail is because slag and cinders are sometimes left in them.

Q. 32. What are your views as to the comparative value of cut rails and of repaired rails?

(Objected to.)

A. The cut rail I consider of more value.

Q. 33. What sum, if any, in your judgment, could the Cleveland and Pittsburgh Railroad Company afford to expend on a rail in repairing the same?

(Objected to.)

A. I don't think that any sum would be economy.

Cross-examination by Samuel H. Turrill:

Q. 34. Who was the president and superintendent of the Cleveland and Pittsburgh Road during the time you worked there?

A. There were several. There were at least four presidents, but most of the time J. N. McCullough was president, also general superintendent.

952 Q. 35. What other roads was he superintendent or president of?

A. He was president of no other, to my knowledge. He has been superintendent or general manager of other roads a part of the time—general manager of the roads leased by the Pennsylvania Company.

Q. 36. Was he the president and superintendent of the road at the time he gave you orders to use your own judgment in regard to repairing the rails on the road?

A. I think he was.

Q. 37. How many machines with clamps, as you call it, have been used on your road for repairing rails, and at what places, at any one time?

A. My recollection is that we have not more than two sets. They were located at Cleveland shops.

Q. 38. What do you mean by two set?

A. That is, the part that was used for one rail would be called a set. I don't know what you term it.

Q. 39. What length of road was under your charge as road-master during the time that you were on the road above referred to?

A. About 130 miles.

Q. 40. What road or roads was he superintendent of before the leasing of any roads by the Pennsylvania Central, and for how long a time?

A. He was superintendent of the Cleveland and Pittsburgh and the Pittsburgh, Fort Wayne and Chicago. I don't know how long a time he was superintendent on the Pitssburgh, Fort Wayne and Chicago. I don't know when he commenced. He has been superintendent of the Cleveland and Pittsburgh, I think, since 1857, within a year or two; am not positive as to the exact time.

Q. 41. Did you or not know, or have heard, that they had been repairing rails externally on the Pittsburgh, Fort Wayne and Chicago Railway since Mr. McCullough has been superintendent of that
953 road, and using from fifteen to twenty-five machines for that purpose since the year of '58.

A. I do not.

Q. 42. How many men did you employ in patching rails at a fire, and how many fires at your shop in Cleveland and on the Cleveland and Pittsburgh Road?

A. I think there were from two to three men at a fire, and there were two fires. The matter was taken charge of by the machinery department.

Q. 43. Were these two fires kept steady in operation patching rails during the time that you stated?

A. I don't know as to that; I don't remember.

Q. 44. Did you have any control of the men that were patching rails in your department?

A. None at all.

Q. 45. How often were you in the shop when they were patching rails?

A. Probably once in a week, or such a matter.

Q. 46. Did you have any charge under your department in paying the men that worked at patching rails, or for the material used for that purpose?

A. No.

Q. 47. Then you know nothing about the cost of repairing rails, as you stated, with clamps, from actual knowledge yourself?

A. I heard it at the time from the master mechanic and foreman of the smith-shop, who had charge of the work.

Q. 48. Is that all you know about it, what they told you?

A. Inquired with them often on the subject.

Q. 49. How do you know that the rails did not average over a foot?

A. I take that from my recollection of actual observation at the time.

Q. 50. Did you have anything to do with contracting for new iron or rerolled iron in your department?

A. That was always done by the president; I had nothing to do with it.

954 C. Q. 51. Do you know of your own knowledge what it has cost at any time to get iron rerolled?

A. Bills always came through my office from the parties furnishing the iron—came to me first. I also had the statements of the president what the contracts were made at.

C. Q. 52. When and where did you ever get iron rerolled at fifteen dollars per ton?

A. We had iron rerolled as low as that, I think, here in Cleveland,

about the time we first commenced to reroll iron, if my recollection is right, about somewhere in '59 or '60.

C. Q. 53. Did you ever have any iron rerolled before that?

A. We may have commenced somewhere along in '58; I could not exactly say within a year or two years.

C. Q. 54. At what rolling-mill was this work done?

A. We had some at the rolling-mill on the Lake Shore here, then run by A. G. Smith. Soon after that, we had some from Johnstown. I have forgotten the exact figures paid; it was somewhere along between fifteen and eighteen dollars; I know that.

C. Q. 55. What was the highest price paid for rerolling rails between the years 1860 and 1870, by your road?

A. I couldn't just say; somewhere about $30. I know the price paid here was about thirty-four or thirty-five; last year we paid twenty-four and a half.

C. Q. 56. Did the Cleveland & Pittsburgh Railroad have any interest in this rolling-mill operated by A. G. Smith, which you spoke of?

A. None that I know of.

C. Q. 57. Are you a blacksmith by trade, or ever work at the business?

A. No, I am not; never did.

C. Q. 58. Is the iron used in patching rails of a purer or better quality than the rail itself?

A. I don't know.

C. Q. 59. What causes the rail to break ("at or near") the
955 junction of the weld with the old rail, as you stated in your direct examination?

A. That would be merely conjecture; I can only state my opinion; I attribute it to the burning of the iron, destroying the texture of it in some way. The fact is, then, that the rails did break.

C. Q. 60. Would heating and repairing a rail, if properly done, destroy the texture of the iron?

A. I think it might under some circumstances. I don't know how, if properly done; it might be done in such a way that it would not. I have seen iron in the way of tools and such like, come from the forge damaged by fire so as to be useless.

C. Q. 61. You state, in your direct examination, "the repaired portion would never ride as smooth as the other portion of the rail." How do you account for that?

A. I account for it from the fact that the surface of the repaired portion was not as smooth as the balance of the rail.

C. Q. 62. What made it rougher?

A. Well, I don't think they could make it as smooth with ordinary labor. They could not apply as much labor to it as would make it as smooth without making it cost unreasonable.

C. Q. 63. Does it require a large amount of labor to make the top surface of a rail smooth when repaired in a machine with clamps as you have stated, using a top swage, such as is used in the work, and the rail and patch being heated to welding-heat?

A. It would seem to. We were never able to get it as smooth as the balance of the rail.

C. Q. 64. Do you think riding over a road where rails have been repaired, as you have stated, that you could detect the difference between mended iron and rerolled iron?

A. I have always been able to on our own road.

C. Q. 65. Do you have any new rails break in your road? If so, at what points in the rail do they usually break?

956 A. I never remember to have had new rails break—what you would call break. I have had them fracture soon after they were put in.

C. Q. 66. Are iron rails, after they have been heated, harder or softer as to the metal, after they become cooled, as they are usually heated and cooled in patching rails?

A. It is my opinion they would be softer at that point where they were heated, unless the iron was burned or something; then it might be made more brittle.

C. Q. 67. Do you think that the rails you speak of were burned in patching, so that it destroyed the qualities of the iron?

A. I couldn't say.

C. Q. 68. S'pose you take the end of a rail and repair it properly—welding the patch on with heavy sledges—will that patched portion wear longer or shorter than the balance of the rail, providing it hasn't been in use but a little?

A. I believe that the new portion, being well hammered, would wear longer than the balance of the rail. Hammering iron has a tendency to refine it and make it wear longer.

C. Q. 69. Supposing you had a rail that had given out, in or near the center, what have you done with such rails since you have practiced cutting off the ends, as you have stated?

A. Do the same with that, cut out the damaged portion—make two rails of it.

C. Q. 70. What length of rails do you have in your main track?

A. Twenty-seven feet now.

C. Q. 71. Have you always, since you have been road-master, and cut rails, as you have stated, put the cut portions in the main track or side tracks, and how short a piece that has been cut do you usually put in the tracks?

957 A. We have as often put the cut portions in the main track, as the side track—well, oftener. Don't hesitate to use them at all in the main track. In the main tracks between stations, we don't usually use shorter than from nine (9) to twelve (12,) but around stations we can use shorter.

C. Q. 72. What kind of rails do you use or have you used on your oad?

A. It is called the T-rail.

C. Q. 73. Have you used what is called the fish-rail, or rails that are fastened by a fish-bar?

A. Yes; we have them in use now universally.

C. Q. 74. How long have they had them in use on the Cleveland & Pittsburg Railroad?

A. Some eight years.

C. Q. 75. Do you cut those rails on the track when they become damaged?

A. Yes; we do.

C. Q. 76. How do you fasten them again with the fish-plate?

A. We use a chair instead.

C. Q. 77. How do you know that a rail that has been laminated, and that portion cut off, the balance of the rail will wear longer than a rerolled rail laid in the track? Have you ever tried it to test it?

A. In the first place I did not say it would wear longer, but that I would as soon trust it. The latter part of the question I can answer by saying that I have tried it, and that they have worn longer.

C. Q. 78. Then, as I understand you, that hammered iron will wear better than rolled iron, if the fractured portion of the rail had been properly repaired, the rail would have been as good or better than a new rerolled rail. Is that so or not?

A. I should say the more work iron had the better it would be; that portion of the rail was hammered, the patch hammered I believe would wear longer than that portion not receiving that work. But that the hammering of a foot of the end of a rail would not make the bal-
958 ance of the rail wear any longer, and that the giving out or breaking of those rails repatched, was not in or on the patch, but at the end or back of the patch.

C. Q. 79. You say we use clamps, same as used by other roads, for holding the rail. Suppose you remove those clamps and have nothing to support the rail but upon a common anvil, what success do you think you would have had in repairing rails that way?

A. Well, I am not much acquainted with the details of the work at all. I think the clamps would be very convenient if you are going to repair rails.

C. Q. 80. Do you know of your own knowledge whether there was any account kept of the number of rails mended and amount of work done on them, and the cost of the same, in which you have testified to as having been mended?

A. Yes; I know. I have seen the books at the shops while I was doing the work, and all the material used in the work was charged as having been done on them. Material was charged and worked, and labor and number of rails kept and the cost of the same, the cost per rail, for doing the work; from memory I can't give the exact figures.

C. Q. 81. Were those books kept in your department?

A. No, sir.

C. Q. 82. How long since have you seen those books and looked into the matter of repairing rails?

A. Not since we abandoned the work in 1859 or 1860.

C. Q. 83. What wages did the books show that they paid the men at each fire, and the cost of fuel and iron for patching?

A. Well, I had forgotten entirely all those details; couldn't say; couldn't get within gun-shot of it.

J. R. CONRAD.

959 WILLIAM CALLOW.

My name is William Callow; am 43 years of age. I reside at Kingsville, Ohio; am a blacksmith by occupation.

Q. 84. Have you been examined in this case before; if so, when?

A. I have; in January, 1870.

Commissioner here says that he took the deposition of William Callow on the 6th, 7th, and 8th of January, 1870, and that the witness name was misspelled in the printing thereof, making William Cullen instead of William Callow, the present witness.

Q. 85. Please look at model marked "Cleveland vise," and also one marked "False anvil and support," and state whether they correctly represent the vise or block now used by you at Kingsville, O., for repairing railroad-rails, and state whether you have had in continued use said vise or block since the taking of your deposition in January, 1870.

(Objected to.)

A. They do. I have used them continually since the taking of my deposition in January, 1870.

Q. 86. I notice that there is a roller attached to the rear end of the vise or block; does or not the bottom of the rail get any support from said roll, when the rail is clamped in the jaws for the purpose of welding on the patch?

A. It does not.

Q. 87. Does said rail get any support whatever from the false anvil, when in the jaws to receive a patch?

A. It does not.

Q. 88. What use do you make of said false anvil in the process of repairing rails?

A. We cut off rails; we straighten off the edge of the rail when putting on a center patch.

960 Q. 89. Do you use the jaws at all in cutting off a rail merely?

A. We do not.

Q. 90. Are you doing the same amount of work at the present time, and have you been for the last two years, as you were in the habit of doing before the alteration was made by taking out two or more inches of the anvil underneath the rail?

A. As near as I can figure, we are, at the present time, and have been for the last two (2) years.

Q. 91. You say in your deposition of January, 1870, that you were receiving 46 cents a rail for labor; do you receive the same sum at the present time; if not, what sum do you receive?

A. We are now receiving 40 cents a rail.

Cross-examined by Mr. Turrill:

C. Q. 92. How many rails do you average in repairing per day at one fire, as near as you can get at it?

A. Twenty-two (22) rails.

C. Q. 93. Does the anvil, termed false anvil, stand close to the machine; close to the end of the block, as represented by the model marked "Cleveland vise?"

A. It does stand close, but don't touch.

C. Q. 94. If I should bring you a model like the one marked "Cleveland vise," and you had never heard it called by any name, what would you call it?

A. I should call it an anvil for repairing railroad-iron.

C. Q. 95. Would you call it an anvil or a machine for repairing railroad-iron?

A. I should call it an anvil.

C. Q. 96. Suppose you remove the jaws—have nothing to support the rail but an anvil to place the rail upon—what success do you think you would meet with in repairing rails?

A. Not very good.

961 C. Q. 97. Then you think with nothing but the anvil to rub the flangs of the rail on, would be a poor thing to repair them on, do you?

A. Yes, sir; I do.

C. Q. 98. Do you keep any account of the amount of work done on the rails, in feet and inches?

A. Not now.

C. Q. 99. About what do you think the amount of patching done on the rail is, and what was it when you kept an account of it?

A. One foot; the average was about the same when I kept an account of it.

C. Q. 100. What wages do you pay your helpers and smith, and how many men do you have at each fire?

A. Pay helpers fifteen shillings per day; the smith I pay two dollars and three shillings a day; have three men at each fire.

C. Q. 101. Do you know how much coal or coke you use at each fire per day; if you do, how much, and how are the fires blown—by blast or bellows?

A. I do. Seven bushels of coke; fires are blown by blast.

C. Q. 102. Do you know the cost of the coke per bushel or ton? and, if so, please state it.

A. I do not know it.

WM. CALLOW.

WILLIAM BENEDICT.

Q. 103. What is your name, age, residence, and occupation?

A. My name is William Benedict; am 42 years of age; reside at Cleveland, Ohio; am foreman of the blacksmith department of the Cleveland shops, Lake Shore and Michigan Southern Railroad.

Q. 104. Where were you employed, prior to coming to Cleveland, and in what capacity were you so employed?

A. On the Toledo division of the same road, at Norwalk, as foreman of the blacksmith department.

962 Q. 105. Have you been examined before in this case, and if so, when?

A. I have; I think in January, 1870.

Q. 106. Look at model marked "Cleveland vise"—state whether it is a correct representation of the one used at Norwalk when you had charge of the blacksmith-shop?

(Objected to.)

Model marked "Cleveland vise" here shown to witness.

A. It is not.

Q. 107. In what respect is it the same, and in what respect does it differ?

A. It is the same in every respect, except that there was no roller attached.

Q. 108. Did you use a roller in connection with the rear end of the vise, and also between the vice and furnace; if so, what office or function did these rollers perform?

(Objected to.)

A. We did, for the purpose of getting the rail out of the furnace to the block.

Q. 109. When the rail was clamped in the jaws of the block or vise, did or not the bottom of the rail get support from the rollers?

A. It did not.

Q. 110. Was there, or not, sent to you at Norwalk a false anvil or support, to be used in connection with the vise, such as represented in the model, marked "False anvil or support;" if so, what use or disposal did you make of it?

(Objected to.)

A. There was one sent to me; set it out at the rear end of the shop and straightened old iron on it.

Q. 111. Then you did not use it in connection with the vise; if not, why not?

A. I did not; did not see any use for it.

Q. 112. You will please look at model marked "Cleveland vise," and also at model marked "False anvil or support," and state whether

963 it correctly represents the vise and its appurtenances, as now used at the Cleveland shop, which you have charge of for repairing railroad-rails?

(Objected to.)

A. I think it does.

Q. 113. Does the rail, when clamped in the jaws of the vise to weld on the patch, derive any support from the false anvil in front and the roll in rear of the vise?

A. It does not.

Q. 114. What office, then, or function, does the roller or false anvil perform in the process of repairing rails at the Cleveland shops?

A. The roller supports the rail in moving back and forth from the furnace to the block; the anvil supports the rail in dressing up the side. After welding on the patch, we turn the rail on its side to smooth up the edge.

Q. 115. Is the false anvil used in dressing up the sides of the rails that have been patched on the end, or those that have been patched in the center?

A. Those that have been patched in the center.

Q. 116. How are the rails dressed up on the sides that have been patched only on the end; on the jaws of the vise, or only on the false support?

A. Sometimes on the jaws of the vise, and sometimes on the support.

Q. 117. When the rail requires repairs at the centre more than nine feet from the end of the rail, can you dress up the sides of the rail, after it has been patched on the jaws of the vise? If you say you cannot, please give your reasons.

A. I cannot. The furnace is so low the rail strikes the top of the furnace before it's high enough for the block.

Q. 118. What are you then obliged to do in order to dress up the sides of the rail as indicated in the foregoing question?

A. Use the anvil. I mean the false support.

964 Q. 119. What other function, if any, does this false anvil perform other than the dressing up of the sides of the rail, after it has been patched in the jaws?

A. Use it in cutting off rails.

Q. 120. When you cut off the rails on the false anvil, do you make any use of the jaws?

A. We do. Cutting part of the way, cut in through the ball of the rail, then slide it on the false anvil, cutting the balance off.

Q. 121. Why are you not obliged to use the false anvil in the shop at Norwalk as well as at the shop in Cleveland?

A. The furnace, I think, stands higher at Norwalk, or the block lower than it does at Cleveland.

Q. 122. Then if the vise at Cleveland stood say four inches lower, so that the jaws of the vise would be on a level with the furnace, the sides of the rail after patching could be dressed upon the jaws—could they or not, and thus dispense with the false anvil?

A. They could.

Q. 123. Are the jaws of the vise and the furnace at Norwalk on a level; and for this reason the false anvil was dispensed with?

A. I think the jaws of the vise and the furnace are nearly the same height. It was not dispensed with for use, for we never used it.

Q. 124. Would you have been under the necessity of using the false anvil had the jaws of the vise stood as high above the furnace as they do at the Cleveland shops?

(Objected to.)

A. I think we should.

Cross-examination by Samuel H. Turrill, esq.:

C. Q. 125. Do you repair railroad rails yourself?

A. I do not.

C. Q. 126. How often do you go into the rail-repairing shop, and at what distance is it located from the shop you have charge of in Cleveland?

965 A. From four to twelve times a day. I should think it was some fifteen rods from my shop.

C. Q. 127. Why do you go so often?

A. I go four times a day to see that the men are there to work; at other times for different purposes.

C. Q. 128. What are those different purposes?

A. Sometimes to take work over for the men to do that work at blacksmithing in the same building; at other times to see how they are getting along with the work.

C. Q. 129. Are you foreman of the T-rail shop?

A. I am.

C. Q. 130. How long have you been foreman of the shop in Cleveland?

A. Since the first of March, 1872.

C. Q. 131. How long would it take to raise the machine used in patching rails in Cleveland four inches higher, or lower it four inches, to bring it level with the furnace?

A. I should think about one day.

C. Q. 132. Why don't you have it done, if it would be any benefit in patching rails?

A. Don't know that it would be of any benefit.

C. Q. 133. If I should show you this model marked "Cleveland vise," and you had never heard it called by any name, knowing what you do about machines for patching rails, what would you call it?

A. Rail-block.

C. Q. 134. What success do you think you would meet with in repairing rails on a block like the one marked "False anvil or support," if it had grooves in the edges like those in the jaws of the Cleveland vise and nothing else to hold or support the rail?

A. Don't know anything about it. Never had any experience in it.

Redirect:

966 Q. 135. How many blocks like Cleveland vise, the back roller removed, were in use on the Toledo division when you left there to come to the Cleveland shops, and have such blocks or vises been in use since your evidence was taken in January, 1870?

A. There were six (6) in use when I came from there. Most of them had been in use since January, 1870, five (5) of them had been used all the time, and one of them most of the time.

Q. 136. Have the blocks during this time given as good satisfaction in repairing rails as stated in your evidence in 1870?

A. They have on the Toledo division. I cannot say as to the Cleveland shops.

Q. 137. Any fault found with the block or vise as used at the Cleveland shops, as far as you know?

A. There was not.

Q. 138. When rails are put into the jaws of the Cleveland vise, with false support in front, what is the difference, if any, between the bottom of the rail and the top of the false anvil, when different rails are clamped in the jaws of the vise?

A. Don't think there is any difference with the different rails. I have never repaired but one kind of iron since I have been here. None of the rails I repaired when clamped in the jaws of the vise rested on the top of the false anvil or support.

W. BENEDICT.

The deposition of Robert Eccles, of Springfield, Massachusetts, taken at the request of and on the part of the defendants, to be used in the case of Samuel H. Turrill vs. The Illinois Central Railroad Company and others, pending in the circuit court of the United States for the northern district of Illinois.

967 ROBERT ECCLES, being duly sworn, doth depose and say, in answer to interrogatories proposed to him by S. M. Whipple, esq., for the defendants, as follows:

Int. 1. What is your name, age, residence, and occupation, and how long have you been so occupied?

A. Robert Eccles; age, 49 years. I reside at Springfield, Massachusetts. I have been foreman in the Boston and Albany Railroad Company's blacksmith-shops, in Springfield, nearly sixteen years, and am now.

Int. 2. Does the Boston and Albany Railroad Company repair railroad-rails?

A. Not that I am aware of. We are not doing it here in Springfield.

Int. 3. Has the company at any time since you have been foreman repaired rails; and, if so, about how long, and when did they discontinue such repairs?

A. They were repairing rails when I came here, (in Springfield,) in 1856, and continued such repairing twelve or thirteen years, I should think.

Int. 4. What kind of tools did the company use in repairing rails?

A. The common swage-block, with grooves in the side to correspond with the sides of the rail. Afterwards, for six months, more or less, we used the Vanhorn hammer. The rail was held by clamped jaws operated by an eccentric lever. We found that very much more expeditious than the old way of repairing by hand, because we held a very much longer heat, and the jaws were of corresponding length.

Int. 5. Did repairing rails come under your special supervision?

A. Yes, sir.

Int. 6. Did there come to your notice any complaint touching the point as to whether the rails were any more serviceable in the track repaired on the common swage-block or in the clamping jaws?

A. There was not.

968 Int. 7. Please explain the difference, if any.

A. When rails are welded by hand, the surface will not be generally so uniform as rails welded by power or steam-hammer.

Int. 8. Did you at any time keep an accurate account of what it cost your company to mend rails; if so, what did it cost per lineal inch or foot?

A. I kept a daily account of the number of rails we repaired; also, of the number of feet and inches we repaired, I think, for two or three years, the object being to get at the cost of repairing rails. Mr. Whipple came to me a few days ago to get information in regard to our rail-work. I have examined my papers, and find the following is a copy of the only account I have of our rail-work, the other books and papers having been destroyed, I can't say how. The copy appears to represent

the month of January, 1858, and does represent that month, and is as follows, to wit:

(Copy.)

JANUARY, 1858.

Labor		2666	
		2205	
24½		2205	
Labor		2406	
		1975	
19¾		1975	
13,883 lbs. coal, $8		5553	
1,637 lbs. iron, 4 cts		6548	
Charcoal		144	
	558)	25877	(46 209/558
		2288	
474 rails		3557	
759 ends		3343	
85 webs		209	
558½ feet		558	

ROBERT ECCLES.

969 I append said copy to my deposition, and make it part of the same, showing the cost to be a fraction over 46 cents a lineal foot.

Int. 9. Is said copy taken from the original record as kept in 1858?

A. Yes, sir.

Int. 10. What kind of tools were used for doing this work?

A. The common swage-block, the same as already described.

Int. 11. What kind of a rail was then used?

A. The common T-rail, 21 feet long.

Int. 12. Since you have discontinued repairing rails, what is the course pursued when a rail becomes battered at the end so as to become unfit for further service in that condition to enable you to get further service from rails so battered?

(Objected to.)

A. The track-hands cut off the ends of the rails, and put what is left in some other parts of the track.

Int. 13. By such a course, is the necessity of freighting the rails to and from shop, as heretofore, for repairs, obviated?

(Objected to.)

A. It is.

Cross-examined by Charles M. Reed, for the complainant:

C. Int. 1. Was the original record, from which the account above referred to was taken, kept by yourself personally?

A. I can only answer that in this way: As I previously stated, Mr. Whipple came to me for information. I found the paper alluded to, and it is the only account I have of rail-work at any time. I kept my
970 accounts at the time we were repairing rails, and I suppose and believe this to be authentic. That answers the question rather indefinitely, and I cannot answer in any other way.

C. Int. 2. You cannot state positively, then, by whom that record was kept and made out?

A. I cannot. I do not remember anything distinctly about it now.

C. Int. 3. Then you do not know, of your own knowledge, whether this was the actual amount of work done during the time covered by this record?

A. I have no doubt of its correctness.

C. Int. 4. Have you any exact recollection of the amount of work done and of the cost of the work during the time purported to be covered by the account which you have annexed, independently of the information derived from the examination of the account?

A. I have not.

C. Int. 5. Where is the record from which you say the account annexed by you to this deposition was taken?

A. It is either at the shop or my house, if I have not lost it. I supposed I had it with me.

C. Int. 6. You say that you found this record a few days ago, and that this is the only record upon the subject which you are able to find. Where did you find this?

A. At the blacksmith-shop.

C. Int. 7. In what form was this record; was it in a book or upon a single sheet of paper, and were there other accounts upon the some book or paper?

A. It was upon a single leaf, as I judge from my book.

C. Int. 8. Did you personally measure the amount of work done each day in mending rails while this kind of work was done by the company in the month of January, 1858?

A. I did not measure myself. The men employed measured and reported to me.

971 (Charles M. Reed, counsel for complainant, objects to the admission of so much of the witness's deposition as relates to the account of work done, and the cost of said work, during the month of January, 1858, and to the admission of the copy of the account annexed to said deposition, on the ground that the deponent has no personal knowledge of the facts stated in the account, and of the amount of work done, and the cost of the same during the time to which his testimony relates.)

Direct examination resumed:

Int. 1. Did you believe such report to be correct, and do you now so believe?

(Objected to.)

A. I believe the report to be correct.

A. Int. 2. Were you or not requested this morning to bring with you the original account, of which the appended is a copy, for the purpose of appending the same to your deposition?

A. I was.

Int. 3. Will you return to the shop, and, if possible, bring the original account?

A. I will.

(The witness, having done so, returns and produces an account.)

Int. 4. Examine account marked "B," and state whether the same is the original account above referred to?

A. It is.

Int. 5. According to your best knowledge and belief, was said account, marked "B," made, as purported, on or about January, 1858, and do you believe the same to be correct in all its details?

(Objected to.)

A. To my best knowledge, it was so made. I believe it to be correct in all its details.

972 Int. 6. Will you annex said original account marked "B" to your deposition?

A. I will.

Int. 7. Is the account marked "A" the copy of said original account marked "B," which you have referred to?

A. I intended it to be so.

(The complainant objects to the admission of the account marked "B," on the ground that it does not appear that deponent has any knowledge of the correctness of the account or of the items stated in it.)

ROBT. ECCLES.

COMMONWEALTH OF MASSACHUSETTS,
Hampden County, ss:

On this 20th day of April, in the year of our Lord eighteen hundred and seventy-two, at my office in Springfield, in said county, the aforesaid deponent personally came before me, and, he being first sworn to speak the truth, the whole truth, and nothing but the truth relating to the cause for which the deposition is taken, gave the foregoing deposition, by him subscribed in my presence, and read to him by me, and the same was reduced to writing in his presence. Taken at the request of the defendant, to be used in the case of Samuel H. Turrill vs. The Illinois Central Railroad Company and others, pending in the circuit court of the United States for the northern district of Illinois. The adverse party was present.

[L. S.] JOHN M. STEBBINS,
Notary Public.

973 United States circuit court, northern district of Illinois.

SAMUEL H. TURRILL *vs.* ILLINOIS CENTRAL RAILROAD COMPANY AND John M. Douglass.	In chancery.
SAMUEL H. TURRILL *vs.* CHICAGO, BURLINGTON AND QUINCY RAILROAD Company and Amos T. Hall.	Same court.
SAMUEL H. TURRILL *vs.* MICHIGAN SOUTHERN AND NORTHERN INDIANA Railroad Company and E. B. Phillips.	Same court.
SAMUEL H. TURRILL *vs.* CHICAGO AND ALTON RAILROAD COMPANY AND T. B. Blackstone.	Same court.
SAMUEL H. TURRILL *vs.* PITTSBURG, FORT WAYNE AND CHICAGO RAILroad Company, etc.	Same court.

974 Testimony taken on the part of the defendants in the matter of accounting herein, before me, W. C. Witter, notary public, N. Y. Co., and pursuant to consent of complainant, S. H. Turrill, and Geo. Gifford and S. M. Whipple, counsel for defendants.

NEW YORK, *May 9th*, 1872—10 a. m.

Present, complainant in person and Henry Waters, on his behalf, and Geo. Gifford, on behalf of the defendants.

JOHN BOYD ELIOT, a witness of lawful age, produced on the part of the defendants, having been first duly cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter of accounting herein, and being examined by Geo. Gifford, of counsel for defendants, deposes and says as follows:

Q. 1. What is your name, age, residence, and occupation?

A. John Boyd Elliot; age, 45; residence, New York City; am a mechanical engineer and solicitor of patents.

Q. 2. State somewhat in detail what have been your opportunities in becoming acquainted with improvements in the arts and with different kinds of mechanism and machinery.

A. I began very early in life the study of mechanics as a science, and to apply the principles thereof by actual work in the shop, both in wood and in metal; am generally acquainted with the principles of science as applied in the arts; have planned and superintended the construction of a great variety of machinery, a large portion of which was used in the manufacture of iron and steel, and in converting the same into various useful products; was for some years the editor of the Scientific

975 Artisan, during which time and since I have solicited several hundreds of patents, and have been called almost daily for the last fifteen years in consultation concerning their validity and ability. I have often testified as an expert before the United States courts in patent cases, in which sewing-machines, harvesters, engines, and mills of various kinds were involved.

Q. 3. Have you made yourself acquainted with the letters-patent on which this suit is brought, granted to Joseph D. Cawood, and among other things have you read the copy of that patent printed in complainant's record, page 29 to 43?

A. I have, is my answer to both branches of the question.

Q. 4. Have you examined a certified copy of letters-patent granted to Hugh Baines dated Sept. 17, 1867?

A. I have.

(Counsel for defendants puts in evidence here a certified copy of the letters-patent of the United States to Hugh Baines dated Sept. 17, 1867, which is marked "Exhibit Baines' patent, W. C. W., notary." Also a certified copy of the specification and drawing of English letters-patent granted to Anthony Gilchrist dated August 15th, 1816, and numbered 4060, which is marked "Exhibit Gilchrist patent, W. C. W., notary.")

(Exhibit Baines' patent and Gilchrist patent objected to on the part of the complainant.)

Q. 5. Have you read the copy of English letters-patent granted to Anthony Gilchrist, and marked "Exhibit Gilchrist patent?"

A. I have.

Q. 6. Have you caused a model of that Gilchrist patent to be constructed? and, if you have, please produce it.

A. I have, and here produce the model.

(Introduction of model objected to on the part of complainant.)

976 (The model is marked "Exhibit Gilchrist machine, W. C. W., notary.")

Q. 7. I see in the model you have produced marked Gilchrist machine there are four rollers and eight rims for the surfaces of those rollers. Why have you caused the eight rims to be made?

(Objected to.)

A. The four rims having the V-edges, and marked *g* 1, *g* 2, *g* 3, *g* 4, were made for the purpose of representing accurately the rims of the rollers or wheels in the Gilchrist machine as represented in the drawings attached to the Gilchrist patent. The other four rims are made for the purpose of adopting the machine to the rolling of railroad-rails.

Q. 8. By what authority did you make the four rims as the part of the model of a form adopted to rolling a railroad-rail?

(Objected to.)

A. Desiring to produce an article in the form of a railroad rail by the process of rolling, I found in the Gilchrist patent a machine for rolling metals in which there was the combination of four rolls or wheels provided with adjustable runs or rims that could be removed from the four wheels and others substituted in their places for the purpose of adapting them to the work to be performed. The title of said patent is as follows:

"A newly-invented machine for the making of nails, screws, and the working of all metallic substances."

The specification describes how these four wheels are to be combined together so as to act upon opposite sides of the metal at the same time in its passage between them or during the process of rolling. The specification explains that it is the intention of the inventor to use

977 the machine for forming whatever shapes may be desired to make the designs upon the faces of these rims, and that the machine may be used with two of the wheels as "moulding-wheels, with flat circumferences and not angular," and "in that case the other two wheels were merely to keep the heated metal in the proper place." The patent authorizes me to make the shape of the faces of the rims of whatever form may be desired.

Q. 9. Suppose you wished to roll a bar flat on three sides and concave on the other side, do you find authority in the Gilchrist patent for adopting the rims of the wheels or rollers to roll a bar of that shape?

(Objected to.)

A. I do.

Q. 10. Have you read and made yourself acquainted with a copy of English letters-patent granted to Cornelius Whitehouse, dated Jan. 30, 1845, and numbered 10696? If you were, did you read and examine it?

(Objected to.)

A. I have read and examined such a patent in one of the bound volumes of English patent-reports in the Astor Library in this city.

Q. 11. Is it or not against the rules of that library to have these volumes removed from the building?

(Objected to.)

A. It is against the rules.

Q. 12. Have you a copy of the specification of that Whitehouse English patent, made from said volume?

(Objected to.)

A. I have had a tracing made of the drawings in said patent, as shown in the first sheet thereof, there being three sheets of drawings in all, and I have had a copy made of that portion of the specifi-

978 cation which pertains to the first part of the invention set forth in said patent, which is stated to be for welding and hammering metals.

Q. 13. Look at the copy marked "Exhibit part of Whitehouse specification, W. C. W., notary," and say whether that is the copy you refer to in your last answer.

(Objected to.)

A. It is.

Q. 14. Have you caused the model to be made of that Whitehouse machine, or any part of it? If yes, produce it.

(Objected to.)

A. I have caused a model to be made, and here produce it, to represent a portion of the Whitehouse patent that pertains more particularly to the anvil and jaws connected therewith, as arranged underneath what is called in the patent a rotating hammer. I have not added in said model all the gearing shown in the tracing to which I have already referred, but simply so much as would illustrate the arrangement of the jaws and their operation under the hammer; and I did not take the trouble to make the universal joint that connects the portion of the hammer shaft to which the hammer is attached with the horizontal portion that is fixed in the bearings in the main frame of the machine, but have simply introduced a spiral spring for such connection, which permits the hammer to be rotated, and at the same time to rise from or approach towards the anvil. So far as the anvil and its jaws are concerned, they are made about twice the dimensions of the drawings above referred to, and are substantially a correct representation thereof.

(This is marked "Exhibit Whitehouse machine, W. C. W., notary.")

979 Q. 15. Have you read and examined English letters-patent to William Church, No. 1097, dated May 5, 1846?

A. I have.

Q. 16. Have you examined the models (exhibits) Church machine numbers 1 and 2, and Church machine numbers 1 A and 2 A, and do they correctly represent the Church machine described in said patent so far as they purport to represent it?

(Objected to.)

A. I have examined them and believe they do.

Q. 17. Have you examined the models exhibit "Whitcomb machine," "Ills. C. R. R. Co. machine," "Beebe & Smith patent," "Beebe & Smith block," "Bayonet vise," "Michigan Southern," "Joseph D. Cawood, patent Sept. 9, 1856?"

A. I have.

Q. 18. Have you examined the models marked "D. E. M. U. S. C.," "D 2, A 3," "C. E. M. U. S. C.," "E. E. M. U. S.," and "Cleveland vise?"

(Objected to.)

A. I have.

Q. 19. State whether or not there is anything described in the Cawood patent which is employed in the Bain machine represented by the model "Bain machine, H. W. B," assuming the parts of the machine which are outside of the housings for rolling the sides of the rails to be removed.

A. There is not.

Q. 20. What part of the model "Bain machine, H. W. B." is not described in the Bain patent before referred to?

A. The friction-rolls, mounted on brackets, projecting out from one of the housings of the machine, at the end where the grooves are pro-

vided for rolling the sides of the rail, said friction-rolls serving as guides to the bottom of the rail in its passage between the projecting ends of the drawing-rolls. I observe also that there is no axis or shaft
980 provided with cams to press one of the guide-rolls towards the side of the rail in the process of rolling on the metal on the head of the rail, as shown in the model "Bain machine, H. W. B." In the Bain patent the device there shown is simply an eccentric lever mounted upon a pin in the center of a yoke that reaches from one side of the machine across to the other and over the lower roll. I also notice in said patent an addition set of guide-rolls, whose axis are in a plane outside of the drawing on top and bottom rolls in said machine. These are not shown in the model "Bain machine, H. W. B."

Q. 20. State whether or not such a machine as is represented by model "Bain machine, H. W. B.," is substantially described in the Cawood patent.

(Objected to.)

A. It is not.

Q. 21. State whether or not a machine like model "Bain machine, H. W. B." has a mode of operation substantially like the machine described in the Cawood patent.

A. The mode of operation is very substantially different.

Q. 22. Explain what is the difference in effect upon the metal between hammering and rolling a bar of metal, and produce any diagram or drawing which you may have in illustration of your answer.

A. In the process of hammering, the molecules of the metal are forced together upon each other between the face of the hammer and the anvil in the line in which those two bodies are brought towards each other, and those molecules which are not directly in that line are driven to a greater or less extent outwards from said line in every direction, and therefore the property or quality of the metal which constitutes what is termed its fibrous character is to a great extent lost.
981 The molecules of the metal in the process of hammering are condensed, one upon the other, so that the metal becomes solidified, but without producing to any considerable extent the fibrous quality called toughness; whereas, in the process of rolling, the molecules of metal are drifted backwards from the rolls from the point where the bar begins to be compressed by them, and produces a fibrous quality in the metal something like what would appear in the operation of combing back the fibres or filaments of a rope, but without any torsional action thereon, very similar to the process of spinning; and, to illustrate these pecularities of difference between hammering and rolling, I have made, and here produce some diagrams to illustrate the shapes that the molecules of the metal dispose themselves under the two processes. The first sheet, marked "Exhibit forms of metals rolled," represents a longitudinal section of a portion of a rod, having been rolled, and a cross-section of the same. The sheet marked "Exhibit hammered metal" represents a section of a plate where the hammering has been done in one point of the plate, and illustrates how the several layers of the original plate spread out or dispose themselves under the process of hammering. Another sheet, marked "Exhibit heavy hammering," is to illustrate how the metal is affected when very heavy blows are brought to bear upon it, as compared with light hammering, which is shown in "Exhibit light hammering," in another sheet, and I have presented these last two exhibits to show the care that must be exercised by the workman in the process of hammering, in adapting his labor to the metal and the work intended to be ac-

complished—that is, if he wishes to spread the end of a rod or bar of metal so as to produce a flange similar to what is shown in the process of riveting, light blows must be used, otherwise he would fail in ac-
982 complishing his object; but if the metal is intended to be upset or swelled some distance from the end, then very heavy blows should be brought to bear upon it; so, also, in welding two pieces of metal together, great care must be taken not only in the direction of the blows upon the metal and toward the anvil, but also at proper adaptation of the force of the blows thereon. In the process of rolling no such care is required, inasmuch as whatever portion of the metal will not pass between the rolls are floated or drifted back, to be re-formed in a succeeding passage through the rolls, or to be removed as waste metal after the process is completed. The difference between rolled and hammered metal may be shown by examining the structure of the metals themselves, by making sections of the same, and applying acids thereon, when it will appear that those metals that have been rolled will have the fibres of the metals disposed or arranged substantially in the line of the direction in which the metal passed through the rolls, while in the metal that has been hammered the fibres will be arranged in irregular directions, distributed out from the point where the greatest degree of hammering has been done.

Q. 23. Look at sheet marked "Exhibit effect of rolling," and explain what it represents?

A. It is intended to represent the manner in which the metal is drifted or forced back from entering between the rolls, the large portion of the straight bar representing that portion of the unfinished metal to be operated upon, and previous to its introduction between the two rolls, which are represented by the two circles in the diagram. The smaller portion of said bar, and all of that part of it which is reduced to the size of the nearest points of contact between the rolls or circles there represented, shows the portion of the bar that has been finished.

983 Q. 24. If the top-roller in a machine like the model "Bain machine, H. W. B." were removed, and an attempt should be made to hold a railroad-bar by the remaining three rollers, and patch it by hammering, what would be the effect upon the metal of such hammering?

A. The metal would be spread out sidewise between the guide-rolls, and be driven out of shape at all points except exactly in the plane passing through the axis of the rolls, and between the hammer and the lower roll, the metal would be condensed in the same plane.

Q. 25. Could a rail be practically mended by welding pieces on by holding it in the holding-device mentioned in the last question—I mean by hammering?

A. It could not, not near so easily, if at all, as without any such devices. I would prefer to mend a rail on a common anvil instead of punching it on any devices.

Q. 26. What instrumentality for operating on the top of the rail to mend it is such holding-device adapted to?

A. A roller.

Q. 27. Is or not rolling a bar of metal a substantially-different operation from hammering it?

A. It is.

Q. 28. State whether or not there is in the "Bain machine, H. W. B," such a stationary press-block, or substantially such a stationary press-block, as is described in the Cawood patent?

A. There is not.

Q. 29. State whether or not there is in the Bain machine represented by the model "Bain machine, H. W. B." substantially such a movable press-block as is described in the Cawood patent?

A. There is not.

Q. 30. State whether or not there is in the Bain machine, represented by model "Bain machine, H. W. B," substantially such means of combining press-blocks as is described in the Cawood patent?

A. There is not.

984 Q. 31. State whether or not there is in the Bain machine, represented by said model, such means for operating press-blocks as is described in the Cawood patent?

A. There is not.

Q. 32. State whether or not the wheels or rollers in the Gilchrist machine are adjustable toward and from each other?

(Objected to.)

A. They are.

Q. 33. Which are nearest alike, the Bain machine, represented by said model, and the Gilchrist machine; or the Bain machine and the machine described in the Cawood patent?

(Objected to.)

A. The Bain machine and the Gilchrist machine.

Q. 34. What, if any, substantial element is there in the Bain machine which is not in the Gilchrist machine?

(Objected to.)

A. I do not know of any, so far as pertains to the combination of four rolls and their adjustibility, relatively to each other, or that portion of the Bain machine which is included between the housings.

Q. 35. You say if the top roll of the Bain machine were removed, the remainder would not so hold the railroad bar as to make a practical machine for mending bars by hammering? How would it be with the holding-device in the Church machine in that respect?

(Objected to.)

A. My opinion is that a machine constructed like the model Church machine would be well adapted for holding the rails to be repaired by hammering.

Q. 36. Which holding-devices are nearest alike, that in the Bain machine and that in the machine described in the Cawood patent,

985 or that in the Church machine and described in the Cawood patent?

(Objected to.)

A. Those holding-devices that are in the Church machine are substantially like those described in the Cawood patent.

Q. 37. Is the holding-device in the Bain machine substantially alike or substantially unlike the holding-device described in the Cawood patent?

A. I do not consider that there are any holding-devices, in the proper sense of those words, in the Bain machine at all.

Q. 38. Please give your reason.

A. Any devices constructed to hold a substance, in the proper sense of the term, imply the idea of fixedness, and devices that clasp the rail in the Bain machine are so constructed and adapted in the machine as not to hold it in a fixed position, but to permit it to change its position longitudinally, and by that means or change of said position to accomplish the object for which the machine is made. The very organization of the machine requires that these several parts that embrace the rail

and give it its shape in the process of being repaired *require that they* shall constantly change their position, and hence cannot be called holding-devices.

Q. 39. Then, if I understand you, the bar is only acted upon so as to change or displace any of its parts in the Bain machine, while the bar is being moved longitudinally. Is that so?

(Objected to as leading.)

A. It is.

Q. 40. Is that peculiar to a rolling-machine?

A. It is absolutely necessary.

986 Q. 41. How is it with the Gilchrist machine in that respect?

(Objected to.)

A. Precisely the same as in the Bain machine.

Q. 42. How is it with the Whitehouse machine, as to whether or not the bar is in motion or at rest while the hammer or instrument is acting upon it?

(Objected to.)

A. It is so constructed as to clamp the bar and hold it at rest to receive the action of the hammer.

Q. 43. How is it with the Church machine in respect to the bar being in motion or at rest while being acted upon?

(Objected to.)

A. It must be at rest.

Q. 44. How is it with the Cawood machine in respect to the bar being in motion or at rest while being acted upon to patch it?

A. It must be at rest.

Q. 45. Could a railroad-bar be patched by the use of the Gilchrist machine? If you answer it could, please state how.

(Objected to.)

A. It could, and all that is necessary to be done to accomplish such a purpose would be to adapt the bands, termed in the Gilchrist patent moulding bands, to the configuration of the rail; that is, a flat band for the bottom of the rail and a grooved band for the top, and bands that correspond to the sides of the rails placed opposite each other as in the model Gilchrist machine, or at right angles to the plane of the other two rolls; then set the several rolls relatively to each other, so as to conform to the size of the rail when finished; then place the patch of metal that is to be attached upon the portion of the rail to be mended,

987 and bring the two to a welding-heat, and pass them between the rolls, as already described, when in motion, and the travelling action of the rail longitudinally between said rolls would complete the operation of welding.

Q. 46. In case the object be to patch a rail of any given form, do you or not find in the Gilchrist specification directions to adapt the bands to that form of rail?

(Objected to.)

A. I find in said patent that the forms of the bands may be adapted or shaped to the work to be done on them. The patent itself was issued before railroad-rails of the now common forms were produced.

Q. 47. How is it with the Whitehouse machine, as to its having a stationary jaw and a movable jaw?

(Objected to.)

A. There are in the Whitehouse machine a fixed or stationary jaw and a movable jaw.

Q. 48. For what purpose, according to the Whitehouse patent, are those jaws?

(Objected to.)

A. For the purpose of holding the material or the metal to be forged under the process of being hammered.

Q. 49. With what are the faces of these jaws to correspond in shape?

(Objected to.)

A. To tha shape of the metal desired to be produced or the finished work.

Q. 50. How does the means of moving the movable jaw towards and from a fixed jaw in the Whitehouse machine correspond with the means of moving the movable jaw in the Ill. C. R. R. Co. machine?

(Objected to.)

A. They are the same, both being operated by cranks on a rock-
988 shaft and connecting beams or rods from said cranks to the movable jaw.

Q. 51. How does the means of combining the movable jaw with the fixed jaw in the Whitehouse machine correspond with the means of combining the movable jaw with the fixed jaw in the Exhibit bayonet-vise and in the Exhibit Michigan Southern?

(Objected to.)

A. They are the same, being attached together by a pivotal connection at or near the lower end of a movable jaw.

Q. 52. So far as a fixed and movable jaw and the means of combining them are concerned, which are the bayonet-vise and the Michigan Southern nearest like, the Cawood machine or the Whitehouse machine?

(Objected to.)

A. They are nearest like the Whitehouse machine.

Q. 53. State whether or not there is in the Beebe & Smith machine, represented by model Beebe & Smith patent and Beebe & Smith block, substantially such a press-block as is described in the Cawood patent?

A. There is not.

Q. 54. State whether or not there is in the Beebe & Smith machine, presented by said models, substantially such a movable press-block as is described in the Cawood patent?

A. There is not.

Q. 55. State whether or not the press-blocks or jaws in the Beebe & Smith machine, represented by said models, are combined in substantially the same way as is described in the Cawood patent?

A. They are not.

Q. 56. State whether or not the jaws in the Beebe & Smith machine, represented by said models, are operated by substantially the
989 same means as is described in the Cawood patent?

A. They are not.

Q. 57. Is the mode of operation of the jaws in the Beebe & Smith machine, represented by said models, substantially like that described in the Cawood patent, or substantially unlike it?

A. It is substantially unlike.

Q. 58. How does the Beebe & Smith machine, as represented by model Beebe & Smith patent, correspond with the bayonet-machine in reference to the bottom support to the bar or piece to be wrought upon being in the jaws? I mean the bayonet-machine represented by models D, C, and D_2.

(Objected to.)

A. They are substantially alike.

Q. 59. How does the machine represented by model Michigan

Southern correspond with the bayonet-machine, as represented by said models D, C, and D, in reference to the bottom support to the rail or piece to be wrought upon being in the jaws, and a portion of it movable with the movable jaw?

(Objected to.)

A. It is the same, all of them having bottom supports, and a portion of such support—one-half of it—being in the movable jaw.

Q. 60. In reference, then, to the means of moving the movable jaw, and to what constitutes the bottom support, which is the machine Michigan Southern nearest like, the machine described in the Cawood patent or the bayonet-machines, marked D, C, and D?

(Objected to.)

A. It is nearest like the bayonet-machine.

Q. 61. Is there in the machine represented by model Michigan
990 Southern, or machine represented by model Bayonet-vise, such a stationary press-block as is described in the Cawood patent?

A. There is not.

Q. 62. State whether or not, in the machine represented by said model Michigan Southern, or said model Bayonet-vise, there is such a movable press-block or jaw as is described in the Cawood patent?

A. There is not.

Q. 63. State whether or not, in the machine represented by either of said models Michigan Southern or Bayonet-vise, the press-blocks or jaws are combined substantially in the same way or substantially by the same means as is described in the Cawood patent.

A. They are substantially different.

Examination adjourned by consent to Friday, May 10th, 1872.

NEW YORK, *May* 10—9 *a. m.*—1872.

Present, counsel and party as before.

And being cross-examined by Hervey Waters for the complainant, the witness deposes and says as follows:

C. Q. 64. In answer to the second interrogatory, you state somewhat at length your experience in planning and constructing a great variety of machinery, a large portion of which was used in the manufacture of iron and steel. Will you now be kind enough to explain a little more in detail the specific purpose of those machines which you planned and superintended, as you have stated?

A. Some of the first experiments that I made in the manufacture of iron and steel were in the manufacture of bells, in which efforts were being made to produce a cheaper article of bell than could be made from the bronze or bell-metal, as then most commonly used. I
991 gave advice and plans in connection with those experiments, as to the form of moulds, the kind of mould or material of which it should be made; also the furnaces for melting the metal, and the methods of annealing, and devices for finishing the bells, where they were to be finished. I also assisted in experiments made upon blast-furnaces, more specifically connected with the wasting of the ores, with reference to freeing them from injurious elements, such as sulphur, silicon, &c., gave plans with reference to the apparatus to be used, and superintended a large proportion of the experiments. These experiments led me to the acquaintance of iron manufacturers, and my advice was solicited with reference to the rolling of irregular forms. I was employed to examine as far as possible what had been done on the subject, to advise with reference to what patents, if any, existed for such purposes, and to undertake a series of experiments more particularly with reference

to the production of horseshoe-iron. I made such investigation, gave plans for certain kinds of machinery, and tried a great number of experiments, which resulted in the adoption of many of my plans, and, for aught I know, some of those machines are in use at the present time.

These investigations led me to become adviser to some parties in the manufacture of steel, and for some three years I was chiefly engaged in the investigation of the various qualities of steel, the best kinds of iron to make steel from, the various methods of breaking them, the kinds of furnaces, and advised with reference to experiments to be tried in the process of conversion, the best forms of making it into manufactured articles afterwards, and I have still continued to be the adviser of these steel manufacturers up to the present time.

992 Previous to the taking charge of the steel experiments I planned some machinery for making rails, which also led me into acquaintance with parties who were endeavoring to make screws by swaging or rolling, or in some other way than by the expensive process of cutting. To this, and the manufacture of nails, I gave considerable attention, and built many thousand dollars' worth of machinery, as well as visited the principal iron and steel manufacturing establishments in this country, for the purpose of making myself familiar with many details in their work, both for the purpose of instructing myself and learning what things required improvement.

I had occasion, in following up the experiments in the manufacture of steel, to examine into the manufacture of Bessemer steel, and the best means of utilizing the scrap or portions of the rail that are cut off from a finished rail, where the ingots of steel happened to be larger than is necessary to produce the required length of rail. The utilization of this scrap has been accomplished by my advice, in connection with others, but required considerable experimenting to get it into the proper shape for conversion into useful articles, from the fact that the flanges of the rail cannot receive a sufficient degree of temperature to permit their being turned down upon the web and welded without leaving seams, or what are technically termed cold-sheets. This led to experiments for cutting the rail into such pieces as could be successfully used afterwards. The operation is now successfully practised in several places in this country. I also have had occasion to make some experiments in the manufacture of wagon-axles to determine whether rolled or hammered iron or steel was the best, and this led me to investigate carefully the peculiar character of the metals themselves. I also made experiments in cold-rolling, more particularly with refer-

993 ence to the manufacture of screw-bolts out of square iron, by rolling down the corners so as to form a round portion for the nut or screw.

C. Q. 65. In regard to the manufacture of bells, of which you speak, were they of cast metal or of metal manufactured after being cast?

A. They were cast; that is, the metal was melted and formed in a mould, but the steel that we used had generally been well forged. In many cases we used files to furnish us with the steel that we desired—old files.

C. Q. 66. Do you mean well forged before it was melted or after, when it was made into bells?

A. Before.

C. Q. 67. Did that forging before the melting produce any beneficial result in the bells after they were cast?

A. Probably nothing more than in having a purer quality of steel.

C. Q. 68. Did the forging of the steel make it of any purer quality when it was remelted?

A. Only so far as it improved its quality before remelting.

C. Q. 69. Then you had no experience in the forging of metals in that manufacture, did you?

A. We did, considerable; for we wished to ascertain the relative degrees of the toughness of the metal, as compared with its sonorous qualities, and we would take either pieces of the bell after being broken, or small castings made for that purpose—what are called test-pieces—and try them on the anvil, sometimes cold and sometimes heated, in order to ascertain the various qualities.

C. Q. 70. Was that all the forging you did with regard to those bells, testing those samples upon the anvil?

A. I think it was about all. We made some other experiments by cutting, to determine the various degrees of hardness or softness of the metal.

994 C. Q. 72. A little more now, if you please, in regard to the production of horseshoe-iron. Did you contrive any machines for the purpose of rolling horseshoe-iron; and, if so, what?

A. I did. My first plan was to construct the rolls in the form of cams, so that, as the iron passed through, it would make some portions thinner than others, or where the highest point of those cams approached each other. There was also a groove formed in each of the rolls, to correspond to one of the dimensions of the iron, either the side or edge of the bar. We preferred that this groove should correspond to the sides of the bar, or that which would form the top and bottom of the shoe. The bars of iron were first rolled to nearly the dimensions of what we wished, the cross-section of the shoe to be at its toe. It was then heated and passed between these cam-rolls, and in the grooves in said rolls, on its edge, and thereby form something of the shape of a piece of iron adapted for making a shoe. This, however, did not satisfy the conditions of the trade, and other efforts were made to form the groove in the iron which receives the heads of the nails, and serves as a support to the nails that bind the shoe to the foot of the horse. This requirement then changed the plans of rolling, by so constructing the rolls as that the bar should pass through the rolls on its side; and those rolls were made with a central shaft similar to an ordinary roll, and the shaping devices for forming the shoe-blanks were made in the form of bands or rings, and fastened upon the said shafts or rolls by means of keys; and in addition to the dies or cams for varying the thickness there was formed upon one of the circumferences of the roll a kind of V-shaped rib, the form of which would correspond to the groove to be made in the iron, and the shape to the edge of the bar was produced by being

995 passed through between two rolls just before it entered the drawing-rolls. These were also cam shaped and adjustable.

About that time some parties in the State of New York commenced putting upon the market shoes completely formed, with perhaps the exception of shaping the corks, and our experiments were not proceeded with for some one or two years. They were afterwards, however, taken up, and the iron was put upon the market, shaped and creased, and marked for the nails substantially as I have described.

C. Q. 72. Be kind enough to tell us what you mean by our experiments? Who was associated with you?

A. The first party that consulted with me about the matter, and one who I believe was interested in it all the time, was a man by the name of Greenwood, Cincinnati. There was another party by the name of

Lessing, and another by the name of Swift, who was largely interested in rolling-mills on the Ohio river above Cincinnati.

C. Q. 73. But if I understand right, none of your associates had anything to do with the contrivance of the machine. Am I correct?

A. I believe nearly all made suggestions from time to time, and I derived much of my information from investigations into the state of the art, and from conversation with those whom I considered skilled in such matters; therefore, I do not assume that anything that was done was wholly and entirely my own.

C. Q. 74. Where are these machines now?

A. I do not know, as I have not enquired or been near them, that I know of, for ten years or more.

C. Q. 75. Do you know whether they are in existence or not?

A. I do not, certainly.

C. Q. 76. When was the last time you saw them?

996 A. I think it was the latter part of 1860; it may have been in the early part of 1861.

C. Q. 77. Where were they then?

A. The last one over in Covington, Kentucky.

C. Q. 78. Where was the first one?

A. The first one, I think, was broken up to make castings for the second, and I think that those were made in the Eagle Iron Works, in Cincinnati.

C. Q. 79. Did you ever patent any of these machines?

A. I did not.

C. Q. 80. Why not?

A. I did not regard anything that we had produced as possessing a very good degree of novelty, when taken in connection with what had been done before and after the production of the finished shoe. I thought that the rolling of iron to only a partial degree of shape for the blacksmith would not likely find a very large market; besides, about that time war came on, and I turned my attention to the securing of contracts for manufacturers, and superintending the refitting of arms for the soldiers.

C. Q. 81. How about the last of your machines, which you say you saw at Covington; did you have an interest in that machine?

A. I did not, anything more than as advised.

C. Q. 82. Did you ever have any interest in any of them?

A. If you mean moneyed interest, I did not.

C. Q. 83. How was you employed in them, if you please?

A. My advice was frequently sought by these parties on various subjects connected with patents and improvements in machinery, and they paid my bills as they were presented.

997 C. Q. 84. You did not make drawings of the machines, did you?

A. I made sketches for the draughtsmen to work from.

C. Q. 85. You are not a practical machinist, are you, Mr. Eliot?

A. I profess to be, and claim to be able to go into the shop and do any kind of work, either in wood or metal, that the majority of mechanics can do, and my experience has proven that I am generally able to turn out more work in either of those departments, than most men I can employ either in moulding, forging, or finishing.

C. Q. 86. Did you ever learn any trade?

A. I never was apprenticed to any man, but I began working with tools under the instruction of skilled workmen, in my 14th year. I devoted the principal part of my time to that kind of business until I was about 20 years of age; assisting in the construction of saw-mills, flour-

ing-mills, cloth manufacture, machinery for extracting oil. Then I went to college and devoted much of my time there to the study of those branches connected with engineering.

C. Q. 87. Have you ever been into the shop at work since you went to college?

A. A great many times—weeks and weeks at a time. During the process of constructing a new machine my practice has been to follow the construction of each part from the drawings to the patterns, whether for forging or casting, then following those patterns to the foundry, giving directions how I wished them cast, which side up or down, and observing how the patterns came from the sand, to determine whether they had the proper draft or not; observing also whether the core-prints were perfectly constructed and located, and whether the core-boxes themselves allowed for the proper amount of shrinkage, and
998 whether the cores were properly set in the flasks or not; then watching the pouring of the metal, taking care that it be neither too hot nor too cold, and after the casting was made, following it to the lathe or planer and there giving instructions to the workmen what work to do first, so that the operation might progress onward as far as possible, with change of position or change of tools so as to save time and secure better work.

In the forging department I take the patterns from the drawings, and stay in the shop sufficiently long to instruct the workmen how I planned for these things to be made, what quality of metal, the shape to begin with, and so on, watching each operation through the finishing shop, and, when the machinery is ready to be set in operation, to take charge of it myself, setting it in operation, and taking the chances of being injured if it should fly to pieces in doing its first work.

C. Q. 88. Did you do any work yourself on the horseshoe-rolling mills of which you have spoken as being your contrivance?

A. I do not remember of performing any manual labor thereon. In fact, I think I did not.

C. Q. 89. Who made the last horseshoe-mill which you say you saw last at Covington?

A. I do not remember, nor do I know that I ever heard the names of any of the workmen.

C. Q. 90. Did you have anything to do with the making of it in any way?

A. I gave directions from time to time, as already stated, how the work should be done.

C. Q. 91. To whom did you give the directions?

A. Sometimes to some of the capitalists that were interested in the machine, and in connection with some of them, probably to some of the workmen, though I do not remember of any instance where I spoke to the workmen themselves.

999 C. Q. 92. At whose works was the machine made?

A. I have already stated that I think it was at the Eagle Iron Works in Cincinnati.

C. Q. 93. That's the same place where the first ones was made, was it not?

A. I believe so.

C. Q. 94. In whose possession was this last mill, when you last saw it at Covington?

A. I think it was in possession of a man by the name of Swift.

C. Q. 95. What was the mill doing when you saw it?

A. It was standing at that time, not in operation. The entire force of the mills was turned upon the production of iron for other purposes.

C. Q. 96. In the course of your answers, you have mentioned an individual by the name of Greenwood in connection with the rolling-mills for rolling horseshoe-iron; what was his given name?

A. Miles.

C. Q. 97. Had he any other name?

A. Not that I know of.

C. Q. 98. Was he the proprietor of the Eagle Works?

A. I think he was, one of the proprietors at least. I think there were several partners.

C. Q. 99. He was a very ingenious man, wasn't he?

A. He had the least knowledge of mechanics of any man I ever saw that had conducted a business as successfully as he had done. At one time I heard him say that he did not understand anything about the subject, but he had sense enough to employ men that did.

C. Q. 100. Did you ever see any of the patents of Henry Borden for producing horseshoes from bars of iron, I mean by machinery?

A. I have no doubt that I have seen many of them.

C. Q. 101. Have you any knowledge of the dates of his invention for so producing horseshoes?

1000 A. I remember that some of his patents date back a good many years, but how long I really do not now remember.

C. Q. 102. Do you remember that one of his patents described a machine for producing the complete shoe, with the exception of the corks, and perhaps the nail-holes?

A. I have no doubt there is such a one, for I examined the machinery some eight or ten years ago, for making a complete shoe, and was informed at that time that it was patented; and I was also aware that there had been considerable litigation in connection with some of those patents for making horseshoes, previous to that time; and Mr. Borden himself, among some of our first interviews, explained to me some of his experiences in the production of such articles.

C. Q. 103. Was that interview, with Mr. Borden, prior to your doings at Cincinnati with horseshoe-machines?

A. No, it was after I left Cincinnati and came to reside in New York; about the time I was beginning experiments in the manufacture of steel.

C. Q. 104. Do you know that that patent of Mr. Borden's has expired and become public property?

A. I do not, certainly, but I should be very much surprised to find that it had not.

C. Q. 105. You say that, "previous to the taking charge of the steel experiments, I planned some machinery for making nails, which also led me into acquaintance with parties who were endeavoring," etc. Will you be kind enough to describe, as briefly as you can, the character of that machinery which you so planned for making nails?

A. A suggestion was made to me by a mechanic, as to whether or not a machine for making cut-nails could not be produced, so as to avoid the necessity of burning the plate, and whether or not the blocks could

1001 or could not be formed by punching out each alternate piece, using the intermediate parts or pieces between the several punchings as blanks themselves. I took hold of his idea and tried some experiments upon the iron, for the purpose of ascertaining what the creeping action of the metal would be under the punch. My notion at that time was, that it would be a very difficult matter to cut from a plate by means of a punch two pieces of metal, so small as a nail-blank, without twisting

either the one or the other of the pieces so as to be useless as merchantable nails; but I afterwards went on to build a machine, at my own expense, for the purpose of making the nails complete, cutting the two blanks from the plate at the same instant by one operation of a punch, working in combination with a double-cutting die, or two opposing cutters placed on the opposite sides of the punch. I then added, in combination with those cutters, devices for taking charge of those blanks, carrying them to the gripers and headers of the machine, and succeeded in making a machine that I could cut 150 nails per minute—six-penny nails—and turn the machine by hand.

C. Q. 106. What kind of nails were these?

A. Cut nails.

C. Q. 107. Common board nails?

A. I made what we called a finishing-nail.

C. Q. 108. Did you patent this machine?

A. The first patent was taken out in the name of the man who suggested to me the idea of forming the two blanks in that manner. We have since taken out several patents, in which my name is associated with the others as a joint inventor.

C. Q. 109. What are those machines for in the patents for which your name is associated as joint inventor?

A. For making nails.

C. Q. 110. How do they work?

1002 A. On the same principle. In the first patent we have only covered the punch and double-cutting die for forming two blanks at the same instant. In the succeeding patents we covered all the additional mechanism in combination with that method of cutting that we were entitled to, for the purpose of completing the nails.

C. Q. 111. Have these machines gone into use?

A. They have not.

C. Q. 112. Who owns the patents?

A. I own a part interest in them myself. O. B. Potter, president of the Grover & Baker Sewing-Machine Company, owns the largest interest, I believe. E. S. Renwick also owns an interest, and S. J. Gordon, along with several others. The reason that the machine is not in operation, in my opinion, (and I am not alone in this opinion,) is not due to any defect in that principle of making nails, but to differences among the various owners as to the management of the enterprise.

C. Q. 113. Are you acquainted with the old Perkins nail-machine, something more than half a century old?

A. I am.

C. Q. 114. That's a very simple machine, ain't it?

A. I do not so regard it, from the fact that the most skillful mechanic with whom I am acquainted would not be able to set it in operation and make perfect nails on it without a great deal of experimenting, and unless he had a good deal of pluck he would be very likely to give the job up as a failure. The machine is simple enough if considered with reference to the number of its parts, but the relative position of some of those parts and their form requires the most careful and skillful labor and attention to their successful operation.

1003 C. Q. 115. Did you ever see one of those machines in operation?

A. I have, with also the additional improvements of Reed.

C. Q. 116. Do you know how old Mr. Reed's improvements are, upon the Perkins machine?

A. Not certainly, but I suppose they must date back some 35 or 40 years.

C. Q. 117. The Perkins machine, as improved by Reed, can make such six-penny finishing nails as you say could be made upon your machine, could it not?

A. It can.

C. Q. 118. It makes good ones, don't it?

A. It does, if properly managed.

C. Q. 119. How many can it make in a minute of such good nails?

A. That depends upon the size. Of such six-penny nails, I found one man who could produce about 260 per minute, but there are more of the feeders that fall below two hundred, on that size, than run above it. The number depends chiefly upon the ability of a man to turn the nail from one side to the other.

C. Q. 120. Which costs the most, your machine or the Perkins machine as improved by Reed?

A. Our machine would cost the most, probably about one-third more, but then its capacity was nearly triple, for I have run it to make six hundred nails per minute, which is about as fast as the nail-plate would gravitate to the cutters, and then we fed one plate in after another, so that the machine could run on as long as the cutters remained sharp enough to do their work, without the loss of time that is required in the Perkins-Reed machine, to introduce a new piece of plate.

C. Q. 121. How many pairs of heading-dies are there in your machine?

A. Two.

C. Q. 122. How many are there in the Perkins-Reed machine?

A. Only one.

1004 C. Q. 123. What cuts off the nails in the Perkins-Reed machine?

A. The separation is made by the combination of a movable cutter in conjunction with a stationary one.

C. Q. 124. A plain shears, are they not?

A. Somewhat on that principle, but a plain pair of shears would not make nails practically, or such as could be successfully sold at the present time.

C. Q. 125. Cut them off, wouldn't they?

A. A plain pair of shears would cut off pieces of metal from the end of a plate, but not in a suitable shape to make a finishing nail.

C. Q. 126. Why not?

A. In the first place, a plain pair of shears, without having their edges ground to compensate for the curvature that is produced upon the piece of metal by being sheared off the end of a plate would so curl the piece or bend it, that it would not be fit for a nail till straightened. Then, again, the moving-cutter must travel towards the upper surface of the plate, making such an angle therewith, and with the bottom cutter, or stationary cutter, as that what is termed the creeping of the metal, when squeezed between the cutters, will be prevented, or otherwise the two edges of the nail will not be parallel to each other, and such a nail would not be fit for use for pattern-making or finishing work, as it is almost impossible to drive such an one in light work without splitting it.

C. Q. 127. What do you mean by the two edges of the nail being parallel with each other?

A. I mean when a cross-section is made of the nail, that those parts or lines where the cutting has been done shall be parallel to each other.

1005 C. Q. 128. Is that a fault apt to take place in the Reed machine,

or can it take place possibly when the nails are cut consecutively, as they are cut in that contrivance?

A. It always takes place in the Reed machine, unless the nail-plate is brought to the cutters at the proper angle, and this varies with the quality of the stock as it regards degrees of hardness or softness, and this variation of the stock is produced by the feeder of the machine by varying the position of the rear support to its feeding tongs or nippers that take hold of the plate, by means of which the plate is rotated.

C. Q. 129. In the Perkins-Reed machine the plate is turned over every time a nail is cut, isn't it?

A. It is.

C. Q. 130. Now, if you make one cut, and it does go off at an angle with the plate, and you turn the plate and make another cut, it will go off at the same angle, everything being equal, won't it?

A. It will; and when I had reference to parallelism of those sides or edges, I should have said that the angles with those sides should be right angles, so that a cross-section of a nail would be a rectangular parallelogram.

C. Q. 131. You say that after you contrived the nail-machine, if I understand you right, that you built many thousand dollars' worth of machinery for making screws by swaging or rolling, or in some other way; will you be kind enough to give a short description of those machines?

A. If you did or do so understand me to have said so, you are greatly mistaken. Many thousand dollars' worth of machinery was built for such a purpose, but not by me, although some of the most difficult operations were performed by machinery constructed substantially according to my instructions.

1006 C. Q. 132. I will quote from the record: "Previous to the taking charge of the steel experiments, I planned some machinery for making nails, which also led me into acquaintance with parties who were endeavoring to make screws for swaging or rolling, or in some other way than by the expensive process of cutting. To this and the manufacture of nails I gave considerable attention, and built many thousand dollars' worth of machinery," &c. Now you have been kind enough to tell us about the nail machinery, and what I now desire to ascertain is the character of the screw machinery which you say you built in that connection?

A. I have not told, probably, the tenth part of what I did in the way of building nail machinery. I think the books will show that I spent some twenty or twenty-five thousand dollars, certainly over twenty, in the nail machinery, and other machines in the same department, for the purpose of making the subject a complete one. I did not spend any money in the construction of the screw machinery, but gave plans to others, and occasionally called to look at the work and to witness the operations.

C. Q. 133. Who did build the screw machinery which you planned?

A. I do not know the workman's name.

C. Q. 134. Where were they built?

A. The first one was built in Syracuse, New York. I think some of the others were built over in Connecticut somewhere; I don't know where.

C. Q. 135. Do you know where any of them are now?

A. I do not.

C. Q. 136. I understand you to say that you are acquainted with the Cawood patent, on which this suit is brought, and with the contrivance therein described, and its mode of operation, but I believe you

1007 have not stated what is the principal characteristic of that contrivance, and I will thank you to now state that.

A. As I understand said patent, the invention consists in an improvement upon the common anvil, or swage-block, by combining therewith a fixed press-block, or jaw, the face of which shall conform substantially to the shape of the rail to be mended, and in conjunction therewith a movable press-block, having its face corresponding to the stationery one, or to fit the shape of the rail, but in a reversed position to the stationary press-block, and to be operated by cams or in any other convenient manner, so as to be moved toward the stationary block, and held for the purpose of holding the rail in a fixed position for the purpose of welding on the patch that is to supply the deficient portions of the rail.

C. Q. 137. If I understand you, you say the invention of Cawood consists "in an improvement upon the common anvil or swage-block, by combining therewith a fixed press-block, or jaw, the face of which shall conform substantially to the shape of the rail to be mended, and in conjunction therewith a movable press-block," &c. Now will you be kind enough to say what you refer to as constituting a "common anvil or swage-block" in that combination?

A. I understand by a common anvil a block of metal of sufficient size and strength to sustain or endure the blows necessary to be brought upon it for the work resting upon it, under the hammer, and that it shall have, in this combination, sufficient strength to hold the jaws from spreading apart, and that its upper face between the jaws shall serve as a support to the bottom of the rail, so that the rail, when first taken from the fire, can be swung around and lowered between

1008 said jaws, and rest upon the face of the anvil until it is clamped firmly between the jaws, where it is to be held during the operation of receiving the patch.

C. Q. 138. Now, if I understand you, you think the combination that constitutes the principal characteristic of the Cawood contrivance consists of an anvil upon which rest the two jaws and the rail, together with the said two jaws, and suitable apparatus for working the jaws up upon the rail. Am I correct in this?

A. Not so broad as that, if I understand the language in which the question is put, and not so limited in one sense, as it seems to me that the question would imply that I understand one element of the combination to be the rail itself. To be more explicit, I think the fixed jaw forms a part of the anvil, and is to be firmly attached to it, and does not comprehend so broad an expression as is implied in the question where the jaws are represented as resting upon it, and to be operated towards each other by any means whatever.

C. Q. 139. Will you, then, be kind enough to state in your own language, and as concisely as possible, what are, in your judgment, the essential characteristics in the Cawood contrivance?

A. First. An anvil to receive the part of the rail to be mended when it comes from the furnace. Second. A fixed press-block, either formed with said anvil in the casting or firmly attached to it; and, third, a movable press-block, made to slide upon such anvil towards the fixed press-block by cams, or some convenient mechanism, for the purpose of clasping the rail between the jaws or press-blocks, and holding it in such position while the hammering is being done on the top of the rail.

C. Q. 140. Do you consider it essential in that contrivance that

1009 the anvil should support the jaws or press-blocks, as you have called them, (which fit the sides of the rail,) as well as the rail it-

self, under the blows of the hammer in welding on the patch and shaping the top of the rail?

A. I do.

C. Q. 141. Do you consider it essential in that contrivance that the jaws should support the crown of the rail while the anvil supports the bottom of the rail in welding on the patch with the hammer?

A. I consider it essential that said jaws shall so support the upper portions of the rail that when the bottom of the rail rests upon the anvil, the web of the rail shall not be condensed under the blows of the hammer, so as to swage the rail out of shape.

C. Q. 142. I believe you do not quite answer the question. Do you mean to say yes or no to it?

A. I do not mean to say either yes or no until the precise portion of the rail called in question, the "crown," shall be a little more definitely defined.

C. Q. 143. Do you mean to say you don't understand the question? I mean C. Q. 141.

A. I think I understand the question, and I think the word "crown" is there introduced with the idea of including the top part of the rail, or that portion upon which the wheels roll; and, if so, I could not say yes to such a question, because I do not think the patent requires that the jaws shall embrace that portion of the rail. If the word "crown" is intended to mean no more of the upper portion of the rail than what would be below a plane passing through the greatest diameter of the oval which embraces a cross-section of the head of the rail, then I would say yes.

C. Q. 144. Well, you say you do understand the question, and now will you answer it? I mean C. Q. 141.

1010 A. I have not said positively that I do understand the question; and in my last answer I have given what I consider as a proper answer to such a question from the fact that the word "crown" when applied to a railroad-rail as a defining word includes the entire upper portion of the rail sometimes called the head.

C. Q. 145. Well, that is just what I mean by the word "crown," and I will thank you to answer C. Q. 141 with that understanding.

A. It must support so much of it as is below the patch, and in one sense supports it all, from the fact that that which is below supports all that is above, but I do not mean to be understood as saying that those jaws or press-blocks shall surround the entire head of the rail.

C. Q. 146. What do you mean to be understood as saying in answer to the C. Q. 141?

A. Precisely what I said in my answer to that question, which is substantially this: that those jaws shall support so much of the rail as is necessary to be supported during the process of hammering on the patch, be that much or little.

C. Q. 147. Perhaps we can come at this in another way. Is this model which has been introduced into this case and marked "Joseph D. Cawood patent, Sept. 9th, 1856," a correct representation of the contrivance described and represented in the Cawood patent to which you have referred?

A. I think it is substantially correct. The jaws or press-blocks in said model do not extend up underneath the head of the rail quite as high as the drawings would indicate as necessary. The drawing plainly shows that the press-blocks extend up to a point as high as a plane

1011 passing through the greatest diameter of the oval in the head of

the rail. In the model the jaws do not extend to quite such a hight; otherwise I believe it is correct.

C. Q. 148. In this model the anvil is represented as coming up high enough so as that the bottom of the rail can rest upon it, while the patch is being welded upon the top of the rail, is it not?

A. It is.

C. Q. 149. Suppose that this anvil were cut away, so that the bottom of the rail would not rest upon it while a patch is being welded upon the top of the rail, would it still be the Cawood machine, or would it not?

A. Taking the language of the claim as my guide to such a question, I do not think that the bottom of the rail need necessarily rest upon the anvil, but I regard the anvil as a means of support to the jaws vertically and horizontally, and as a mass to resist the blows of the hammer, as an essential element in that claim, as I cannot understand how the combination could be made between the press-blocks.

C. Q. 150. You have said that, in the Cawood patent, these press-blocks or jaws were represented as coming up as high as the widest part of the head of the rail, and you are probably correct in that; but suppose this model which you say represents the Cawood machine, had the jaws coming up as high as the top of the rail, and fitting the head of the rail, clear up to the horizontal part of the head of the rail, would it then be the Cawood machine, or would it not?

A. If the patch could be welded on with the jaws that high, I do not think it would be proper to exclude such a construction from the invention claimed in said Cawood patent. If the jaws support the already finished portion of the rail, so as to prevent the blows of the hammer from injuring its shape while said patch is being welded thereon,
1012 then I think the conditions set forth in the Cawood patent are complied with, but I think that the machine, so constructed, would not be in as useful a form as if the jaws only extended as high as shown in the drawings, or up to only about the widest part of the rail.

C. Q. 151. Is that the most direct answer to the question you can give?

A. I can say a little more, briefly, that, if all the rest of the parts claimed in the Cawood patent were present in a machine constructed in accordance with the drawings and specifications therein, that so slight a difference as there would be between the height of the jaws shown in the Cawood patent, and that specified in the question, would not, in my opinion, prevent such a machine from being an infringement of said patent; or, in other words, I do not think that the claim of the Cawood patent should be limited to so nice a distinction.

C. Q. 152. Then you think it would still be the Cawood machine, do you not, notwithstanding the jaws did come as high as the top of the rail, as I have before described?

A. I think it would, but not in a very practical form, especially where hammering alone is the means to be used in applying the patch.

C. Q. 153. In answer to C. Q. 150, you say, "If the patch could be welded on with the jaws that high," &c. Now what is your opinion about this? Can the patches be welded on to the rails, according to the instructions in the Cawood patent, "with the jaws that high," and fitting the rail, as I have supposed in C. Q. 150?

A. So far as the welding is concerned it could be done by using a small hammer or the paring portion of the hammer. I think it would require the use of a swage to nicely shape the crown of the rail. Of course, in this answer, I do not understand that the word

1013 "fitting" in the question includes the idea that the jaws shall curve over upon the crown of the rail in extending up as high as the top of the rail, but that a space as wide as the widest portion of the head of the rail is left between said jaws.

C. Q. 154. The magistrate is requested to read to the witness C. Q. 150, to which C. Q. 153 refers, and see how the witness understands that question in regard to the jaws fitting the rail.

A. I understand that question, so far as the word "fitting" was concerned, to apply only to the sides of the rail, and not to embrace the idea of encasing the rail around over the top to the highest point, because, in that case, a rail with a curved crown, as in the Cawood model before me, or as shown in the drawings, could not be mended at all by hammering the patch on it, for the jaws would then be extended up and towards each other, in "fitting" the rail, till they touched each other, or substantially so, and this, I think, is the proper interpretation of that question.

C. Q. 155. Then you think now, do you not, that such a machine as C. Q. 150 describes would not be a Cawood machine?

A. That would depend upon the shape of the rail. For the reason that if the top of the rail were flat, or a considerable portion of it, then said jaws extending to the range which that question calls for, would not meet each other, and the patch could be welded on through the space between said jaws, as already explained in a previous answer, and whenever this can be done, then I think it is properly within the terms of the Cawood patent.

C. Q. 157. Then I suppose that if this cannot be done, you
1014 would think it to be without the Cawood patent, would you not?

A. If it cannot be done by hammering, I should think it would, for the anvil and jaws combined therewith, under such a construction, would be useless.

C. Q. 158. Suppose the head of the rail to be at its greatest breadth an inch and a quarter, and the jaws were made to come up and fit upon the rail so far that they would approach each other at the top of the rail within the distance of one inch, could you in such a machine patch rails according to the instructions in the Cawood patent?

A. I could.

C. Q. 159. Then you think that would be a Cawood machine, do you, provided that everything else was according to the contrivance described in the patent?

A. Not precisely as he intended it, nor do I think in its most practical form, but yet such a machine as should properly be included within said patent.

C. Q. 160. Do you think it would be a practical machine for the purposes of a railroad in mending rails, according to the directions in the Cawood patent?

A. I think rails could be mended on such a machine nearly as readily as in the machine constructed like the Cawood patent, but if I had the superintendence of the work I should cut those jaws down a little, and make it still more practical than it would be without such trimming.

C. Q. 161. Cross-question one hundred and sixty repeated.

A. I think a correct and proper answer has already been given.

C. Q. 162. Is that the most direct answer you can give to the question with safety?

A. I don't understand the question, or what is meant by the word safety, as I am not aware there is any danger in stating what I believe to be the truth.

1015 C. Q. 163. I'll change it, then. Is it the most direct answer that you think it proper to give to C. Q. 160?

A. I think it is, owing to the great range that the word practical has in its use among mechanics.

C. Q. 164. Perhaps we can come at it in another way. On referring to a certified copy of the Cawood patent, I find these words: "The mode of using the machine is extremely simple and effective. A piece of iron, being of a size suitable to the deficiency of a rail, having been prepared and put into the fire—the rail being suspended by its middle to the level of the anvil—is brought to a welding heat, and then swung around from the fire into the space between the two blocks, where it is by a half turn of a crank pinched together by means of the cams F; the welding-piece is then laid on the top of the rail and welded to the rail in the usual way, and leveled up and shaped by a swage, held by the smith, of the form of that section which projects above the blocks; thus accomplishing at one heat what usually required three or more," etc.

Now, following these directions, and for the purpose of patching the rail where the crown or head of the rail at its widest part was an inch and a quarter originally, but where one-half of the head had been split off in some way down to its widest part, what, in your judgment, would be "the breadth suitable to the deficiency" of the patch to be applied to the repairing of the rail?

A. A breadth equal at least to the widest portion of the deficiency. It might, however, be more or less in width, provided there was metal enough in the patch to supply the deficiency, for the reason that as soon as the rail is clamped firmly between the jaws, the action of the swage under the hammer would form the metal to the shape of the space between the jaws.

1016 C. Q. 165. How much less do you think it might be practically?

A. I think there would be no trouble in reforming the rails in such a machine, if the patch were a quarter of an inch less in width on each side, making a half an inch in its entire breadth, provided there was metal enough in the entire mass of the patch, so that when it came under the *the* swage it could be swelled out to fill the space. Of course it would be more difficult to weld patches on to surfaces having such a difference in breadth, inasmuch as the patch in that case would have to be raised to a much higher temperature, or almost into a liquid state, to make the operation successful. If the use of a Cawood machine is to be limited to precisely the manner specified in the above quotation from the patent, (C. Q. 164,) then I would consider that a machine having an unnecessary height of metal on the jaws, or so as to interfere with the welding on of the patch and shaping it, as therein described, would not constitute a practical Cawood machine.

C. Q. 166. What you think, I suppose, is, that a patch three-fourths of an inch wide would be "of a size suitable to the deficiency of the rail," notwithstanding the deficiency was an inch and a quarter wide. Is or is not that your opinion?

A. It is, if the height of the patch is sufficiently great to supply the deficiency of the metal in width.

Examination adjourned to May 11th, 1872, at 10 a. m., by consent.

1017 NEW YORK, *May* 11, 1872—10 a. m.

Parties met, pursuant to adjournment.

C. Q. 167. In answer to C. Q. 165, you say, "I think there would be no trouble in re-forming the rails in such a machine, if the patch were

a quarter of an inch less in width on each side, making a half an inch in its entire breadth, provided there was metal enough in the entire mass of the patch, so that, when it came under the swage, it could be swelled out," etc. What swage do you refer to?

A. I had in my mind at that time any swage, such as is generally known among smiths, and which is sufficiently narrow to enter the space between the jaws or press-blocks.

C. Q. 168. Then you did not refer to the swage which is mentioned in the patent of Cawood, did you?

A. I supposed that the swage that I referred to would be substantially the same as the one referred to in the patent, certainly in degree if not to the full extent. I mean by degree, to the extent, at least, of the smallest space between the upper portions of the jaws?

C. Q. 169. What do you suppose, now, in regard to that matter? I will call your attention to these words in the patent: "The welding piece is then laid on the top of the rail in the usual way, and leveled up and shaped by a swage, held by the smith, of the form of that section which projects above the blocks."

A. I suppose that the swage is to conform to the shape of the top of the rail, or so much of it as extends above the blocks.

1018 C. Q. 170. Do you mean "so much of it as extends above the blocks" in the description of the Cawood patent?

A. I do, if the Cawood patent be followed strictly in every respect in the patching of the rail, the jaws or press-blocks being precisely no more nor no less in height than is shown and described in said patent.

C. Q 171. How is it if the Cawood patent is followed substantially and not precisely?

A. As already stated by me in some previous answers. I do not think that a slight variation in the height of said jaws, relatively with the rail, from what is shown and described in said patent, would constitute a substantial difference from a machine constructed precisely in accordance with the patent, and for this reason any tool in a shop that is intended to do only a part of the work in connection with hand labor or skilled labor, does not require such exact proportions and configurations of all the parts, as where the same devices are used in a machine; consequently the function of this tool as described in the Cawood patent being, as I understand it, to hold the rail which has not yet been misshaped, (except on the top where the patch is to be formed,) and to preserve the original shape of the rail, which is liable to be injured by the blows of the hammer, in welding on the patch, the rest of the work to be done by a skilled mechanic in such matters, using such tools as he finds best adapted for the work, I think that the slight variation of those jaws should not constitute any substantial difference between a machine so constructed, and that described in the Cawood patent. The form of the jaws themselves, so far as the Cawood patent is concerned, must be determined to a great extent by the workman that is to use the tool;

1019 that is, he must adapt them to the shape of the rail to be operated upon, to such an extent as to prevent its shape being destroyed in the process of welding, and so I think that the form of the swage and the height of the jaws, must be determined to a great extent by the workman using them.

C. Q. 172. Do you think you have answered the preceding question—C. Q. 171?

A. I do, and given good reasons for such an answer.

C. Q. 173. Is that a fair representation of the swage referred to in the Cawood patent?

(There is handed to witness a model marked "Swage W, C. W., notary.")

A. So far as the face of the swage is made to conform to the crown of the rail—which I understand is the requirement of the swage in the Cawood patent—I think it is. I, however, cannot see any particular necessity of swelling the sides out to the extent shown in said model. In fact, it is very common in the construction of such swages to begin to curve the sides inwards almost immediately from their face, as the extreme lower edges of such tools have generally very little to do, and the inward curving of the metal on the sides makes it lighter and better adapted as a hand-tool.

C. Q. 174. How do you know that what you say in your last answer "is very common," is very common?

A. By having seen them many times in the shops, having made them, had them made, and having used them.

C. Q. 175. Did you ever patch a rail in the Cawood machine?

A. I never did.

C. Q. 176. Did you ever see one patched in the Cawood machine?

A. Yes, many times.

C. Q. 177. Where and when?

A. I think the first time I saw them patching rails in that
1020 manner, was at Xenia, Ohio, and then at Dayton, Ohio, at repair shops in Detroit or Toledo—I am not certain which of those places—and in Chicago. I cannot remember the years. The first time was several years ago—I should think as much as 10 or 12, or more; and in my travels round through those various western shops, I have seen men at work at repairing rails in that manner.

C. Q. 178. Was it in the use of those Cawood machines, which you say you saw, that they had the swages constructed in the manner which you say "is very common?"

A. It was; as well as in the swages commonly used by blacksmiths in punching the surface of rounded articles.

C. Q. 179. In the use of those Cawood machines which you saw, and the swages which you saw, what proportion of the head of the rail did the swages cover when they were applied to use?

A. They generally reached over what might be called the entire upper surface of the rail. I have often seen the patches applied without the use of the swages, except for the finishing, and many times not even then, the smith relying upon the use of his hand-hammer for finishing the head of the rail.

C. Q. 180. You say in your last answer, that the swages "generally reached over what might be called the entire upper surface of the rail." If you please, what do you mean by the entire upper surface of the rail?

A. I mean all that portion that would lie above a plane passing through the greatest horizontal diameter of the head.

C. Q. 181. De bene esse. I believe in your direct examination you made some reference to an English patent of Church, and to a model marked, "Deft's exhibit Church machine No. 1, and No. 1 A,"
1021 which model you said was a fair representation of what is described in the Church patent. Suppose a machine constructed in every other way like the Cawood patent except that the jaws, instead of coming up as they are represented in the Cawood patent, come up substantially to the top of the rail, as they do in this Church model, could you in such a machine patch rails and dress them off with a swage, in the manner described in the Cawood patent, and as you saw it done

in the Cawood machines, at the several places which you have mentioned?

A. I could in substantially the same manner, and for several of the reasons already given in previous answers; and I may also add, that in this Church model the movable and stationary jaws are made to conform to the sides of the rail, and to extend on up even to encase the edges of the head of the rail, and when brought together upon the rail and held there firmly would constitute a die, to all intents and purposes such as the form required for the finished rail, and all that is necessary to do the work is to bring the rail in between such a pair of jaws, with metal enough in the patch to fill the deficiency of the space between the jaws, and to drive it therein by the hammer. If the smith has a helper, he may use the swage, having the helper to do the striking, and as soon as the metal had sufficiently cooled between the jaws, which operation would take place very quickly, so that the rail could be removed from the jaws without the danger of being upset by the blows of the hammers. The finishing swage might be used if necessary, or any fins might be reduced by light blows of a hand-hammer. This finishing portion of the operation belongs, as I understand the case, more to the workman than to the invention in the Cawood patent, as the purpose for which that invention is made is chiefly to hold the rail when
1022 it first comes from the furnace and is in a very soft condition from the heat, and to maintain its shape in the operation of welding on the patch or combining the patch with the rail, otherwise I do not see why the inventor should have provided grooves in his anvil-block, as described and shown in said patent, for finishing up the sides of the rail in case the workman considered it necessary.

C. Q. 182. You have, I believe, in your direct testimony in this case, referred to the Bain machine, represented by the model marked "Bain machine, H. W. B." Have you ever seen this Bain machine in operation?

A. I have; or one substantially like it.

C. Q. 183. Was it at the works of the defendants, or either of them, that you saw this machine, which you say is substantially like this model?

A. I cannot say certainly, for I do not remember at which of the shops or what road it was connected with, where I *a*sw it.

C. Q. 184. Perhaps you can remember where you saw it, and can get at it in that way?

A. I cannot now remember the name of the town where the shop was located. It was during a trip, while I was making investigations along several of the lines of many of the western roads ra*id*ating from Chicago, and I was searching for information concerning the construction of sleeping-cars, and in order to find various workmen connected with the different shops scattered throughout that portion of the country, I visited a great many places; and my impression is that the machine that I have reference to was at Aurora, Illinois, but I am not at all certain of it.

C. Q. 185. Can you remember when it was?

A. I think it was somewhere about four years ago; three or four years ago.

1023 C. Q. 186. Mr. Eliot, I dare say you are well acquainted with the manufacture of railroad-rails as they are commonly produced. Am I correct in this assumption?

A. I think I know something of the operation, as I have studied the

subject considerably, and have witnessed the operation of rolling railroad-rails a great many times.

C. Q. 187. How many rolls are ever brought to bear upon the work at the same time in rolling railroad-rails?

A. Two, usually.

C. Q. 188. The question is not as to usually, but ever, so far as you know?

A. I have never seen a rail-mill constructed so that more than two rolls were brought to bear upon the metal at the same time, but I have read the description and have examined drawings of a mill where three or more could be applied at the same time.

C. Q. 189. You never knew of such a mill, did you, having more than two rolls for the purpose of rolling railroad rails?

A. If you mean by such a question to ask whether I ever saw one or not, I can answer no.

C. Q. 190. Did you ever hear of one?

A. I have already said that I have read the description of such a mill.

C. Q. 191. Where was the mill?

A. The description did not say, but it was in an English publication.

C. Q. 192. Do you think that you could roll railroad-rails from fagots or bars of iron in a Bain machine such as this model, "Bain machine, H. W. B.," represents?

A. I do not; not from fagots.

C. Q. 193. Well, how about the bars?

A. As to the bars, it would depend upon the shape of them. If their cross-section were nearly the cross-section of a finished rail, and sufficient power applied to the adjustable portions of the Bain machine to hold them firmly in their relative positions as they are combined, I can see no reason why it would not roll a railroad-rail.

1024

C. Q. 194. What I want to get at is whether such a mill as this of Bain is, in your judgment, a suitable mill for producing railroad-rails.

A. I think not.

C. Q. 195. It's a good mill for patching railroad-rails, isn't it, in your judgment?

A. It is.

C. Q. 196. How is the rail supported under the action of the upper roller, in the process of welding on a patch in this Bain machine, as represented by the model?

A. By the lower drawing roller.

C. Q. 197. How is it supported by the lower drawing roller?

A. By resting on its upper surface, and traveling longitudinally thereon, during the operation of receiving the patch.

C. Q. 198. Does the upper surface of the bottom roller support anything else beside the rail?

A. Not necessarily.

C. Q. 199. I didn't ask you about the necessarily, but how is it in the Bain machine, as represented by this model "Bain machine, H. W. B?"

A. I observe when the model of the rail is introduced into this Bain model so as to represent the relative position of the different parts embracing the rail, that it does not support anything else than the bottom of the rail, and in the full-sized machine I can see no necessity for the lower rolls supporting anything else, nor can I see or understand how said rolls could support at all times anything else, for the flanges of the rail forming each edge of the base project out underneath the guide-

rolls on each side of the rail, and would interfere with the resting of those guides upon the bottom roll. Moreover, if they did touch it, the
1025 combination of the two surfaces, coming together at right angles, as they do, would, in my opinion, soon chafe away the under side of the guide-rolls or the face of the bottom roll, so that resting thereon would not be of very permanent duration.

C. Q. 200. Do you know whether, in point of fact, in the use of the Bain machine by the defendants in this case the top of the bottom roll supports anything more than the rail, and that by bearing against the bottom of the rail only?

A. I do not.

C. Q. 201. What are the functions of the side rolls in this machine as represented by the model "Bain machine, H. W. B.?"

A. To serve as guides to the rail in the process of rolling on the patch.

C. Q. 202. Is that all?

A. They also serve to support the under side of the head of the rail during its passage through the machine.

C. Q. 203. Don't they hold up the head of the rail under the action of the top-roll in welding on the patch, and at the same time prevent the head of the rail from getting out of shape under that action of the top roller?

A. They do.

C. Q. 204. What do the jaws do in the Cawood machine, in that respect, when using a hammer? Don't they hold up the head of the rail under the action of the hammer in welding on a patch, and, at the same time, prevent the head of the rail from getting out of shape under that action of the hammer?

A. They do.

C. Q. 205. You have said that the bottom roller in this machine holds up the rail against the action of the top roller in welding on a patch by that top roller; does not the anvil in the Cawood machine hold up the rail against the action of the hammer in welding on a patch in that
1026 machine?

A. It may or may not in the Cawood machine, but is a necessary element in the Bain machine, for the simple reason that the guide-rolls on the sides of the rail do not prevent sufficient surface on the sides of the rail to sustain it in the operation of rolling on the patch, while in the Cawood machine the jaws embrace a sufficient portion of the rail, on the under side of the head thereof, to hold it in proper shape under any ordinary operation of hammering or any blows sufficiently great to weld on the patch.

C. Q. 206. There is nothing in the question to which the witness answers in regard to the jaws. The question is simply in regard to the anvil. What I want to know is, whether or not, in the judgment of the witness, in the use of the Cawood machine according to the instructions of the patent, the anvil supports the rail under the action of the hammer in welding on a patch?

A. The language of the patent concerning that portion of the operation is as follows: "The rail, being suspended by its middle to the level of the anvil, is brought to a welding-heat, and then swung aroun' from the fire into the space between the two blocks, where it is, by a half turn of the crank, pinched together by means of the cams F; the welding-piece is then laid on the top of the rail in the usual way and levelled up and shaped." Now, I cannot find anything in that language, except inferentially, where the bottom of the rail is required to rest upon the anvil. Nor do I think, in nine times out of ten, and perhaps a great

many more, that a rail which has been sufficiently long under the action of the wheels of railroad-trains to wear it or swage it down to such a degree as to require patching of its upper surface would have
1027 the exact height between the under side of the head and the bottom of the rail to reach from the supporting portion of the jaws underneath the head down to the anvil. I know that the action of travel on railroad-rails does compress them vertically and extend them longitudinally: and, therefore, when the jaws are brought up firmly on each side of the rail so as to support it under the blows of the hammer, they will, in a great many instances, raise it up from the face of the anvil and hold it in such a position during the operation of driving on the patch.

C. Q. 207. Cross-question 206 repeated.

A. The instructions in said patent pertaining to that matter is not sufficiently definite for me to determine or give any more specific answer than I have already given.

C. Q. 208. The patent tells you, does it not, to have the jaws fit the sides of the rail up to the centre of the crown of the head?

A. The language in the patent is, "There is cast a raised block, D, nearly as high as the rail, with its farthest edge also shaped to fit the side of the rail when it lies across the anvil in its natural position." It does not say precisely how high said jaws shall be, nor does it speak of the centre of the crown of the head, as stated in the question, but it does say "shaped to fit the side of the rail."

C. Q. 209. Haven't you in the course of your cross-examination said, substantially, that this model marked "Joseph D. Cawood patent, Sept. 9th, 1856," was not specifically like the patent, because the jaws did not come up to about the centre of the crown of the head of the rail?

A. I believe I did say so.

C. Q. 210. Well, now, then, we'll go to the patent once more and see if we can't get at it: "I usually make my improved anvil and
1028 swage block of cast-iron, between four and five feet long and sixteen inches wide across the face, with two forms or recesses, *c c*, at one end right, and left of a form corresponding with the sides of the rail." And then the patent goes on and says: "Close to these is cast a raised block, D, nearly as high as the rail, and with its farthest edge also shaped to fit the side of the rail when it lies across the anvil in its natural position. Next this I attach to the face of the anvil, by dove-tailed tongues and grooves, or any other convenient manner, what I call a movable press-block, E, with a similar but reversed-shaped edge lying opposite the other, so as to enclose the rail between the two as in the jaws of a vice. This block I work by two eccentric cams, F, on a shaft which is attached to the anvil by two standards, H H, with bearings I I either cast on or bolted to the edge of the same, so that half a turn of the crank will move the press-block over a space a little more than the extreme width of the rail. The mode of using this machine is extremely simple and effective. A piece of iron (being of a size suitable to the deficiency of the rail) having been prepared and put in the fire, the rail, being suspended by its middle to the level of the anvil, is brought to a welding-heat and then swung round from the fire into the space between the two blocks, where it is, by a half turn of the crank, pinched together by means of the cams F, the welding-piece is then laid on the top of the rail in the usual way and leveled up and shaped by a swage, held by the smith, of the form of that section which projects above the blocks, thus accomplishing at one heat what usually requires three or more." Now, what I want to know is, if the witness pleases, whether

1029 or no, in his judgment, the anvil supports the rail under the blows of the hammer while welding on a patch in a machine constructed and used according to the directions of the patent as quoted in the question?

A. I have no doubt whatever that it was the intention of the inventor, in constructing his machine, that the bottom of the rail should rest on the anvil in the process of receiving the patch under the blows of the hammer, but I wish to say, in addition, that, in order to do that, the rails would have to be carefully selected by the smiths using such machines, great care being taken that when the rail is so swung round and placed upon the anvil the pinching of the jaws on the opposite sides of the rail will not lift it from the anvil, as is plainly illustrated in the model marked "Joseph D. Cawood patent, Sept. 9th, 1856," in which it will be observed that when the jaws are wide open, so as to drop the rail upon the anvil, it will rest thereon; but when the movable jaw is brought up in said model, so as to pinch the model of the rail therein shown, it lifts the model of the rail so that the bottom does not rest upon the anvil.

C. Q. 211. I now wish to call your attention once more to the patent of Cawood in comparison with the Bain machine, as represented in the model before us. I believe you understand by this time that the directions in the Cawood patent are to have the press-blocks fit the sides of the rail up to about the center of the crown of the head of the rail. Do you so understand it?

A. I do.

C. Q. 212. Will you now be kind enough to look at this Bain model, and see if the two side-rollers do not fit the sides of the rail as it lies across the lower roller up to about the centre of the crown of the head of the rail?

A. They do substantially so.

1030 C. Q. 213. I suppose you understand that one of the press-blocks in the Cawood machine, as represented in the patent, as made to move up to and against the side of the rail, and be there firmly held by means of two cams upon a shaft, which shaft is worked by a lever. Is not one of the side rolls in the Bain machine made to move up to the side of the rail, and there firmly held by means of two cams upon a shaft, which shaft is worked by a lever?

A. The axis of said roll is firmly held by two cams and a side lever, and if the rolls are stationery, or the machine not in motion, then the face of said roll at the point where it touches the rail would be held there firmly.

C. Q. 214. Isn't the roll held firmly up against the side of the rail by means of those cams and that shaft and the lever in the use of the Bain machine?

A. No, it is not; for only a very small portion of the face of said roll is in contact with the rail at any time.

C. Q. 315. Well, isn't so much of the face of the roll as is held in contact with the rail held by means of those two cams and the shaft and lever?

A. It is.

C. Q. 216. Is there anything else to hold it up there?

A. The frame on which its housing rests.

C. Q. 217. What holds that frame up so as to keep the roller against the rail?

A. The cam and its shaft and lever.

C. Q. 218. If the cams were taken away, the frame wouldn't be held up, would it; nor the roller either?

A. It would not, to the side of the rail.

C. Q. 219. What is the office or function of the upper roller in the Bain machine?

A. To roll on the patch.

C. Q. 220. Has it no other office or function besides welding on the patch?

A. It also serves to shape the head of the rail.

1031 C. Q. 221. What performs those functions in the Cawood machine?

A. The blacksmith and his helper.

C. Q. 222. Using what?

A. A hammer and swage.

C. Q. 223. I find on the record of the evidence introduced into this case before the master, where the complainant's witness had seen in operation at Turner's Junction, Illinois, a Bain machine, on the Chicago and Northwestern Railroad, the witness says: "There were also in that machine, first, a bottom roll lying horizontally, upon which the rail was presented to the machine to weld the patch, and upon which the rail rested to some extent, under the pressure of the upper die-roll, while welding on and shaping the patch. There were, also, between the two horizontal rolls (the upper and the lower) two other rolls having vertical axis, which rested upon the lower roll, and which were brought up firmly upon the perpendicular part of the rail, under its crown, for the purpose of supporting the rail, and not only horizontally, but perpendicularly, under the action of the upper roll, while the welding of the patch upon the rail and the shaping of the rail so patched was being done." Do you understand that description?

A. I think I do.

C. Q. 224. You have said that in the use of the Bain machine the rail was held up to the action of the upper roll while welding on the patch by the bottom roll, and that I believe to be true; but, if I understand you, you thought the bottom roll only held up the rail by bearing against the bottom of the rail itself. I think you said the side rolls did assist in holding up the rail, but if in the use of the Bain machine, as described by complainant's witness at Turner's Junction, the side rolls did rest upon the bottom rolls, then would not the upper portion of the bottom roll hold up the rail to the action of the top roll partly by

1032 means of the upper surface bearing against the rail and partly by means of bearing against the under side of the side rolls?

A. It would to the extent that the upper surface of the side rolls would be capable of supporting the under side of the head of the rail.

C. Q. 225. Is it not true that in the Cawood machine, that, to the extent that the upper surface of the jaws is capable of supporting the under side of the head of the rail, the jaws are supported by the anvil?

A. It is.

C. Q. 226. I call your attention for a moment to the housings or frames in which are the side rolls in the Bain machine; do you think that such housings would support the side rolls under very heavy perpendicular pressure?

A. I think they would support all the pressure that the bearing surface of the rolls is required to sustain under the head of the rail, especially when said rail is at a welding heat.

C. Q. 227. But you don't think it necessary to have the side rolls rest upon the bottom rolls, do you?

A. So far as any vertical pressure is concerned upon said rolls, I do not; but in a machine to work practically, and to prevent the formation of fins in the process of rolling, they should work very close together, otherwise the metal would flow out in the spaces between the rolls.

C. Q. 228. You certainly do not understand that, in the use of the Baine machine for the purpose of patching rails, there's any liability of making fins at the bottom of the rail, do you?

A. I think such a result would occasionally take place, unless some care was taken in heating the rail, and also in adapting the pressure of the adjustable rolls to the heated portion of the rail.

1033 C. Q. 229. Is there any other reason why the side rollers should bear upon the bottom roller, except to prevent making fins, in your judgment?

A. I have not, as yet, given any reason for the side rolls to rest upon the bottom roll, either for making fins or anything else, and I am firmly of the opinion that I would not so construct a machine (until I found some reason that I cannot now see) with the side rolls or any portion of their bearings in contact with the bottom roll. I think such a construction would produce a great deal of unnecessary friction, and, being immediately below, the scale of the metal or oxide of iron that would form in the operation and fall into such space, I think a machine so constructed would soon wear out at those parts or points of contact.

C. Q. 230. What is the breadth of an ordinary railroad-rail at its base?

A. About $3\frac{1}{2}$ to 4 inches.

C. Q. 231. How wide or how long would you make the bottom roll of a Bain machine, (at that point upon which the rail rests,) such as is represented by the Bain model here before us, for the repairing of such rails as you have referred to in your last answer?

A. Only wide enough to receive the widest rail to be repaired thereon.

C. Q. 232. That would be about 4 inches, wouldn't it, if the rail were $3\frac{1}{2}$; or would it be a little less than 4?

A. I can't see that it is necessary to make it any wider than the extreme width of the bottom of the rail.

C. Q. 233. How is it with the model marked "Bain machine, H. W. B," in that respect; how wide is the botton of the rail, and how wide is that portion of the bottom roller upon which the rail rests?

A. The rail is $1\frac{1}{4}$ inches in width upon the bottom, and the face of the roll $1\frac{7}{8}$ inches.

1034 C. Q. 234. I find on referring to the record to which I have before referred, that the complainant's witness, in speaking of the Bain machine, which he says he saw at Turner's Junction, that the bottom roll of that machine was 9 inches long, when half of that length would have been more than sufficient to support the rail. You wouldn't have made it so, would you?

A. I would not.

C. Q. 235. If the side rolls were taken out of the Bain machine, or if they were so constructed as not to support the crown of the rail vertically, could you patch rails practically in that machine?

A. I think not.

C. Q. 236. (De bene esse.) You have been inquired of, in your direct examination, concerning the Bain patent, No. 68937; how are the side rolls represented in that patent; do they correspond to the sides of the rail up to about the middle of the crown of the head of the rail?

A. One set of them correspond to so much of the side of the rail as

would form the regular curve in the same direction on said side, thereby making the periphery of the rolls of a rounded shape, so as to fit that portion of the rail which is below the greatest width of the head, or even a little below that. The other set of rolls have their perimeters turned in the form of a groove, so as to reach up from a point a little below where the first set of rolls acts upon the rail, so as to embrace the head of the rail on its edges, and a portion of the top, so as to match or meet the edges of the groove in the top roll, or that portion of the rail upon which the top roll is intended to do its work.

C. Q. 237. (De bene esse.) Do you mean to be understood by this answer to say yes or to say no to the preceding interrogatory?

1035 A. I mean to say no to one set of rolls, because it requires two sets to cover the space mentioned in the question.

C. Q. 238. (De bene esse.) What do you mean to say to the other set?

A. The other set reaches down so as to overlap a portion of the space operated upon by the first set mentioned, and to cover the rest of the side of the rail up to the centre of the crown, as stated in the question, and above it.

C. Q. 239. (De bene esse.) Be kind enough, now, to speak of this other set without referring to the first set, and say whether that other set, to which you last referred, fit the sides of the rail up to about the centre of the crown of the head of the rail?

A. They fit it as far as they touch upon it, but they do not reach more than about half way down the side of the rail.

C. Q. 240. (De bene esse.) And do they not reach considerably above the centre of the crown of the head of the rail—this same other set?

A. They do reach about as far above the centre of the head as they do below it.

C. Q. 241. (De bene esse.) Are either of these side rolls represented in the Bain patent as touching down upon the upper face of the bottom roller?

A. They are not in any of the drawings.

C. Q. 242. (De bene esse.) Are they in any of the descriptions other than the drawings of the patent?

A. They are not.

C. X. 243. (De bene esse.) You have been inquired of here concerning English letters-patent granted to Anthony Gilchrist. Does that

1036 patent describe any such machine as the machine described in the letters-patent to Cawood on which this suit is brought, or does it in any way teach you how to make such a Cawood machine?

A. It does not.

C. Q. 244. (De bene esse.) You have been inquired of in this case, on your direct examination, concerning English letters-patent granted to Cornelius Whitehouse, dated June 3rd, 1845, and numbered 10696. What was that machine for as set forth in the letters-patent?

A. For improvements "in machinery for welding and hammering, and in the manufacture of gun-barrels and other tubes."

C. Q. 245. (*Be* bene esse.) Does it teach you anything else than how to weld tubes?

A. It does.

C. Q. 246. (De bene esse.) What else?

A. Anything that may be desired to be made by such machines by welding and hammering.

C. Q. 247. (De bene esse.) Such as what? Please to specify.

A. The patent does not mention the articles that may be hammered

and welded, other than gun-barrels or tubes, but it is manifest that the devices therein described, if adapted to such work, which is *is* one the most difficult in the working of iron, any other articles that require to be clamped on an anvil to receive the action of a hammer may be worked in such a machine, nothing else being required than the adaptation of the holding devices and the face of the hammer to the work.

C. Q. 248. (De bene esse.) Can't you specify some article to which this machine is adapted other than tubes?

A. Bars or rods of various kinds for any purpose for which such articles are required.

C. Q. 230. (De bene esse.) What kind of bars or rods? Please to specify.

1037 A. Oval-shaped bars or rods for supporting girders in building could be readily shaped on such a machine, connecting rods for engines, locomotives, and anything requiring side pressure to hold the work that has been partially formed, and in which the hammering or welding is to be done on the upper surface so as to finish it. The process of mending rails by hammering the patch on the top could readily be performed on such a machine by simply adapting the faces of the jaws to the sides of the rail.

C. Q. 250. (De bene esse.) I think you said in your direct examination that the model here which is marked "Exhibit Whitehouse machine, W. C. W., notary," was made under your directions. Am I correct?

A. Not exactly so. I employed a man to make a sketch of it, and pointed out the parts that I wished more particularly to be represented, and gave him some instruction about how to simplify the work as much as possible, so as to illustrate in a general manner about how that portion of the machine was to be made. As our time was very limited between the time of ordering the model and the time we wished to have it presented here, and as I was very much engaged in other work, I left many of the details to the model-maker.

C. Q. 251. (De bene esse.) Did you not say in your direct examination as follows, and in an answer to Q. 14, which is as follows: "Have you caused a model to be made of that Whitehouse machine or any part of it? If yea, produce it."

"A. I have caused a model to be made and here produce it, to represent a portion of the Whitehouse patent that pertains more
1038 particularly to the anvil and jaws connected therewith as arranged under the (what is called in the patent) rotating hammer."

A. I did, and more, too, which I will now read from the answer: "I have not added in said model all the gearing shown in the tracing to which I have already referred, but simply so much as would illustrate the arrangement of the jaws and their operation under the hammer, and I did not take the trouble to make the universal joint that connects the portion of the hammer shaft to that which the hammer is attached or with the horizontal portion that is fixed in the bearings in the main frame of the machine, but have simply introduced a spiral spring for such connection, which permits the hammer to be rotated, and at the same time to rise from or approach towards the anvil. So far as the anvil and its jaws are concerned, they are made about twice the dimensions of the drawings above referred to, and are substantially a correct representation thereof."

C. Q. 252. (De bene esse.) Then this is a correct model, is it not, of that portion of the Whitehouse patent that pertains more particularly to the anvil and jaws connected therewith as arranged under the rotating hammer?

A. It is substantially so.

C. Q. 253. (De bene esse.) Is the anvil and jaws taken collectively the same as, or substantially different from, the anvil and jaws taken collectively, as shown and described in the Cawood patent?

1039 A. They are substantially the same, unless the anvil and jaws in the Cawood patent be limited to precisely the kind of anvil and jaws shown and described in said patent.

JOHN BOYD ELIOT.

Redirect reserved.

Subscribed and sworn to before me this 11th day of May, 1872.

[SEAL.] WM. CLITUS WITTER,
Notary Public, N. Y. Co.

Adjourned by consent to Monday, May 13th, 1872, at 9 a. m.

NEW YORK,
Monday, May 13, 1872—9 a. m.

Present, complainant in person and Geo. Gifford, esq., counsel on behalf of defendants.

WILLIAM C. HIBBARD, a witness of lawful age, produced on the part of the defendants, having been first duly affirmed, cautioned to testify the truth, the whole truth, and nothing but the truth, in the matter of the accounting herein, and being examined by Geo. Gifford, of counsel for the defendants, deposes and says as follows:

Q. 1. What is your name, age, residence, and profession?

A. My name is William C. Hibbard; age, 57 years. I reside at West Roxbury, Massachusetts, and do business in Boston. My profession is that of mechanical engineer, and I also act as an expert in mechanics in the trial of patent suits.

Q. 2. Have you been examined in this case preparatory to the hearing therein?

A. I have been examined in a case involving the same sub-
1040 ject-matter, in which I am informed this examination is part of the proceedings.

Q. 3. Have you read a certified copy of the English letters-patent granted to Anthony Gilchrist, and dated Aug. 15, 1816, and marked "Exhibit Gilchrist patent?"

(Objected to.)

A. I have.

Q. 4. Have you examined the model marked "Exhibit Gilchrist machine?"

(Objected to.)

A. I have.

Q. 5. Have you examined a copy of the specification of the English patent granted to Cornelius Whitehouse, dated in 1845, and numbered 10676, marked "Exhibit part of Whitehouse specification?"

(Objected to.)

A. I have.

Q. 6. Have you examined the model marked "Exhibit Whitehouse machine?"

(Objected to.)

A. I have.

Q. 7. Have you examined the model marked "Bain machine, H. W. B."?

A. I have.

Q. 8. State whether or not there is in the Bain machine such a stationary press-block or such a movable press-block as is described in the Cawood patent on which this suit is brought?

A. There is not either of them nor anything which acts as a press-block; nor is there any use for such a device in the machine, as the mode of operation of the machine is not such as would render the use of such a device appropriate.

Q. 9. State whether or not there is in the Bain machine such
1041 means of combining the stationary press-block and movable press-block as is described in the Cawood patent?

A. There are not, because the parts combined in the Cawood patent are not in the Bain machine at all, neither in form nor substance.

Q. 10. State whether or not there is in the Bain machine such means of operating the press-blocks as is described in the Cawood patent.

A. There are not, because there is no press-block in the Bain machine; but as regards the manner in which the frame which holds one of the side rolls is moved up to the rail and held there, there is some similarity in the device employed in the Bain machine, for that purpose, so far as this, that it uses a cam shaft, with two cams upon it, to push the frame toward the other side roller, which shaft is operated by a lever. I do not see any other similarity in the mechanism of the two machines in any part thereof.

Q. 11. State whether or not there is in the Bain machine such a mode of operation as is described in the Cawood patent.

A. There is not, but the two modes of operation which are embodied in the two machines are distinct and separate from their fundamental idea throughout their entire constructions, and there is not an essential part in either machine that is to be found in the other, either combined or operating in the same way.

Q. 12. State whether or not there is anything in the Bain machine, which is described as the invention of the patentee in the Cawood patent.

A. There is not, nor a word of the description in the Cawood patent that I can find that describes any substantial part or function of the Bain machine, or of its mode of operation.

1042 Q. 13. State whether the Bain machine is substantially like or substantially unlike the machine described in the Cawood patent. Answer in respect to its parts, and its mode of operation, and give your reasons for your conclusion.

A. The two machines are unlike, as I have before stated, both in their parts and as a whole. The Cawood machine, although called a machine in this examination, is, more correctly, merely an implement, a device to aid a workman in performing the work of mending a rail, by holding it more securely than he could by merely laying it upon an anvil or swage block, such as was used before his machine. It was never intended that it should actively do any of the work of mending the rail, which was to be done by the smith, with usual smiths' tools; while the Bain machine is intended to actively do part of the work of mending the rail by action of the machine itself, without the intervention of the workman at all, after the rail is put into the machine. Neither of the machines, it is to be observed, performs the whole work of mending the rail. The heating of the rail, the preparation for patching it or restoring it, are in both cases done by the workman, as I understand, in the same way substantially for mending the rail, whether done in either of these machines or by the old swage block; therefore the comparison of these two machines is to be limited by what is done with each machine after the welding

heat is taken upon the rail and its patch, and it is ready to be put in shape, either by the smith, if the Cawood machine is used, or by the Bain machine, if that is used by the agency of the machine itself. Now, this difference in the result of the two machines is due to the fact that

1043 the Bain machine is a rolling-mill, and, by its action as a rolling-mill, has the property of reducing a bar of iron to shape by being carried through the mill by the motion of its rollers; while the Cawood implement is merely a modified anvil; an anvil modified by attaching blocks to it, to support the sides and upper part of the rail as well as the bottom, in a manner described in his patent. It has no power whatever to do any work upon the rail beyond merely holding it in shape, and was not designed to have. It has no moving parts or devices beyond what is necessary to confine the rail in a fixed position, and to embrace a considerable portion of its length, generally the entire length that is to be mended, and there the rail remains in a fixed position until the work of repairing the crown of it is substantially finished, and the work is done on the various parts of the patch, by the striking of the workman upon it in different places, from one end to the other, as his judgment suggests, aided by the swage which the workman applies by his hand, which aids somewhat to give form to the face of the rail.

In the Bain machine, being a rolling-mill, no such confinement of the rail, or use of a swage, or of an anvil, or judgment of the operator is necessary, because the forms of the rolls and their movements carry the rail through the machine, and by the same act fashion it to shape, in the same manner that any other rolling-mill does; that is, that the rail receives the form of the longitudinal contour of the rolling surfaces, and is reduced to a size corresponding to the space between their contiguous surface.

In the Cawood implement the welding and shaping of the rail is done by hammering alone, and the device is constructed with special reference to that operation, and that only; while the Bain machine is designed to shape the iron by the equally well-known operation of rolling it, and the two modes of operation are distinguishable and

1044 well understood in the art of working iron, and they cannot be confounded with each, in my judgment. To do so, is to ignore all mechanical distinction. Each of these machines is organized with reference to the different fundamental ideas upon which they act. One is a machine or device for holding the iron and furnishing an anvil to support it for the smith to work upon it; and the other is a machine to reroll that part of the rail which is mended by a similar operation to that by which the rail is made, and each machine is organized with special reference to *to* these two modes of operation, which are radically different from their very commencement; and, therefore, the essential devices employed in each machine are of necessity different. There are many subordinate devices in the Bain machine to which I have not referred, as they are but aids in the carrying out the substantial mode of operation of the machine which I have before stated.

Q. 14. Could or not rails be mended on the Gilchrist machine?

(Objected to.)

A. They could by having the scores in the rolls of a proper shape.

Q. 15. What substantial element, if any, is there in the Bain machine which is not found in the Gilchrist machine?

(Objected to.)

A. I do not see any. The substantial elements which do the work, I consider to be the four rolls embracing the rails on all sides, and giving it its shape by the act of passing it between them. In this connection,

I think it proper to say that the Gilchrist machine described in the English patent was designed to roll irregular shapes, such as nails, screw-blanks, and other objects, by means of four rollers working to-
1045 gether, in the peripheries of which corresponding forms were made, which together formed a mould or matrix, of a shape corresponding to that intended to be produced. I think it is fairly within the principle of that machine that the scores in the faces of the rolls might be made to fit a rail as well as the form of the nail or other object. It is not so conveniently arranged in its minor details for mending rails as the Bain machine is; but if the scores were made of the proper form to receive the rail, I have no doubt that a rail could be mended in it well.

Q. 16. State whether or not a rail could be successfully mended by pounding, by the use of the Bain side rollers and the bottom roller to hold it, and if you say it could not, give your reasons for your answer.

A. In my opinion, it could not. I will assume, in answering the question, that it means to remove the top roller and place the rail between the side rollers and compress it firmly between them, and in that condition endeavor to weld on and shape the patch. If the rail were put into the machine in this condition, the rollers would touch it only at a small place upon either side, geometrically speaking, only on a line in the plane of the centres of the rolls, which would offer no adequate support to the rail as an anvil, and would leave the rail entirely unsupported in all other parts. If a blow were now struck with a heavy hammer at the bearing points of the rail upon the roller, the surface of the side roller would be imbedded in the iron and prevent the rail from being moved along to find other points of support, without withdrawing one of the side rollers and slipping the rail along and then reclamping it, by bringing the side roller up to it again and then repeating the operation, and so on, for each change of place in the hammering or swaging, which could not be done, practically, on any considerable
1046 length of patch before the iron would be cold, when the surface of the rail which rested upon the roller would be found to be indented at each resting place, mainly by the side rollers. If the hammering upon the rail was done at any distance from this plane of contact of the rolls with the rails, it must be still more disfigured, because unsupported. The reason why this would take place, is because the lower roll and the two side rolls cannot serve as an anvil and two side blocks in that condition, because they do not fit the rail over any considerable space, and offer sufficient resisting surface to preserve the rail in its shape under the action of the hammering which is necessary to weld on the patch and reduce it to form over some considerable extent of the length of the rail.

Q. 17. How is it with the two jaws and the anvil in the Church machine, respecting their holding a rail so that it can be successfully mended by hammering?

(Objected to.)

A. There is no trouble whatever in doing it with the jaws and bed of that machine, if the part which was intended to operate upon the top of the rail were removed. The jaws and bed then would act precisely as they act in the Cawood machine, and would hold the rail the same way.

Q. 18. What do you say as to whether or not the jaws of the Whitehouse machine would hold a rail, or that it could be successfully mended by pounding?

(Objected to.)

A. They would hold it successfully if the faces of the jaws were made to embrace a rail closely, and removing the striking apparatus which was designed to work in connection with such an anvil. I do not see that it would require any other change.

1047 Q. 19. Could the two side rollers and the lower rollers of the Bain machine be successfully substituted for the clamps in the Cawood machine?

A. They could not.

Q. 20. Why not?

A. For the reasons already stated in my answer to Q. 16; and, in addition to them, I will say, that, as in the Bain machine, the lower roll corresponds in position, with reference to the rail, to the anvil of the Cawood device, and the two side rolls corresponds in position with reference to the rail, to the side blocks of Cawood. Now, if it were attempted to use the three rollers of Bain in the manner of the three parts named of Cawood, it would be necessary to attach one of the side rollers to the lower roller, permanently, and to cause the other rollers to slide upon it somehow, a condition of things which would not be very favorable to their action as rollers, and would require a considerable modification and reconstruction of the machine, and be good for nothing when done.

Q. 21. State whether or not a machine represented by the model, "Michigan Southern," or a machine represented by the model, "Bayonet vise," or a machine represented by the model, "Beebe & Smith block," would contain substantially such a movable press-block or jaw as described in the Cawood patent.

A. They would not. The movable press-block or jaw, as described in the Cawood patent, was made to slide upon the upper face of the anvil toward the fixed block, to clamp the rail sidewise while it rested upon the anvil.

In this connection, it appears to me proper to say, in explanation of the terms "Cawood machine," and "Cawood patent," which have been used in this examination, and to prevent my being misunderstood, that the terms are capable of several different meanings, according to the construction and scope of invention given to the patent. My

1048 view of the matter is simply this, that the machine described in the patent, and used as described in the patent, consisted essentially of an anvil, or flat surface, upon which the rail rested, to which a fixed jaw fitting one side of the rail was permanently attached, and a movable jaw also resting on the same surface, which was moved up to and compressed the rail by some device which would hold it up to the rail with sufficient firmness, and I have no doubt that this was the manner of constructing and using the machine that Cawood intended; but if we look at the machine, without reference to the patent further than to leave its general construction and mode of operation, as appears to be indicated by its claim, then it appears to consist, essentially, of two jaws embracing the rail laterally and fitting the same, between which the rail is clamped, and massive enough, either in themselves or their attachments, to serve as an anvil, and fitting the head of the rail over a sufficient surface to preserve its form under the hammering; then, in that case, the mode of operation would cover the three machines mentioned in the interrogatory.

Again, if the terms are meant to cover only the machines as modified by Cawood, then it would embrace only the modifications to be found in the machine described in Cawood's patent, as compared with what before existed, which appears to me to be merely a modification of form

which enables the machine to fit a railroad rail instead of some other object, which in my opinion does not constitute an invention, and some modifications in the form of the parts which are not to be found in the three machines mentioned.

Q. 22. State whether or not a machine represented by the model "Michigan Southern," or a machine represented by the model
1049 "Bayonet vise," or a machine represented by the model "Beebe & Smith block," would contain substantially such means of combining and operating the press blocks or jaws as are described in the Cawood patent?

A. They would not. The difference in the mode of constructing the parts, and the manner of arranging and combining such parts, would, in my opinion, be patentable of themselves, as compared with Cawood's; and the Beebe & Smith block is so different from the bayonet vise and Michigan Southern, that it would be patentable by itself as a different arrangement and combination from them.

Q. 23. If the Cawood patent be so construed as to exclude from the angle-iron machine represented by the model marked "X, E. A. D., U. S.," for the reason that the iron held by it did not rest upon the anvil, then would or not mending rails by the use of such a machine as is represented by model "Ill. C. R. R. Co. machine," or such a machine as is represented by the model "Exhibit Michigan Southern," or such a machine as is represented by the model "Bayonet vise," be within the patent, assuming that the bottom of the recess between the jaws be so removed as to give no support to the bottom of the rails?

(Objected to.)

A. They would not, for the reason that neither of them would have an anvil so combined with the jaws that the rail would be supported by the bottom surface.

Q. 24. If the bottom of the recess between the jaws in machines represented by model "Ills. C. R. R. Co. machine," or the model "Bayonet vise," or the model "Exhibit Michigan Southern," be so removed as to give no support to the bottom of the rail, which would those machines then
1050 be most like, the angle-iron machine, represented by model marked "X, E. A. D., U. S.," or the machine described in the Cawood patent?

(Objected to.)

A. They would be most like the machine represented by model "X, E. A. D., U. S."

Q. 25. If the Cawood patent be limited to a combination, one of the elements of which is an anvil giving support to the bottom of the rail, then would a machine like the model "Ills. C. R. R. Co. machine," or like model "Bayonet vise," or like the model "Michigan Southern," so constructed and used that the bottom of the rail does not touch anything while being mended, be within the Cawood patent?

(Objected to.)

A. They would not, of course.

WM. C. HIBBARD.

Subscribed and affirmed before me, this 13th day of May, 1872.

[SEAL] WM. CLITUS WITTER,
Notary Public, N. Y. Co.

WILLIAM C. HICKS, a witness of lawful age, produced on the part of the defendants, having been first duly cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter of

accounting herein, and being examined by Geo. Gifford, of counsel for the defendants, deposes and says as follows:

Q. 1. What is your name, age, residence and profession?

A. William C. Hicks; 42 years of age; reside at Summit, New Jersey; doing business in New York City, and am an engineer.

1051 Q. 2. State briefly what opportunities you have had for becoming acquainted with the mechanic arts and machinery, what has been your experience touching those subjects, and whether you have been examined heretofore as an expert witness before the courts.

A. Since the time of my graduation at college, at the age of 19, and three months previous to that event, I have been engaged almost entirely in mechanical pursuits, having had practical experience especially in steam-engines, sewing-machines and machinery, fire-arms and fire-arms machinery, and connected therewith rolling-mills, forging-apparatus and the like. Three months before leaving college I became an apprentice in the Ballordvale machine-shop at Andover, Massachusetts, first in the draughting-room and afterwards in the shop; made drawings of machinery and locomotives. After my graduation, I was employed as rod-man and civil engineer upon the Rutland & Burlington Railroad; and after the completion of the road, I went into the employment of Woodruff & Beach, in Hartford, as draughtsman and shop-time-keeper. I was soon after appointed boss of the shop, and continued in that capacity, principally directing the manufacture of engines, for about two years. During this time I was enabled to continue my education as a practical workman. I was allowed the use of tools and machinery, and I superintended the construction of many machines designed by myself partially or wholly, and became quite familiar with paper-mill machinery, powder-mill machinery, carpet machinery, water wheels, sugar-mills, and the like. I then went into the employ of Col. Sam'l Colt, as draughtsman, during which time I was in the shop daily, superintended the construction of the machines designed by Mr. Root, the superintendent, and myself, from the making of the patterns

1052 to the completion of the machine in the shop and to the setting up in the armory. I was at one time boss of the armory in the absence of the foreman by sickness. I was the chief engineer of Col. Colt in the building of his dike and armory in the South Meadows. I was the city engineer of the city of Hartford, Connecticut, during the construction of the pumping-engines for that city, and assisted in the designing of them, and was cognizant of their whole construction. In the summer of 1855 I was made assistant superintendent of the Volcanic Repeating-Arms Co. of New Haven, Conn., purchased nearly all the machinery which they needed in the manufacture of their arms, and designed nearly all the new power-tools, some of which were entirely of my own invention. Among these tools and this machinery, so purchased and used, were drops for forging, dies for the same purpose, trip-hammers, &c.

I had made myself familiar with the forging of iron and steel into shapes while in the employ of Colt, but not practically; but here I went into the matter, and worked with my own hands, arranging the drops and dies, and attending and supervising their first use. I also designed other forging fixtures for the use of trip-hammers, and from this experience I invented a new drop, which, in its essential features, was adopted by the United States Armory, and certified by it to be the best ever used there. I was afterwards superintendent for the Ladd and Webster Sewing-Machine Company, in Boston; was the first superintendent of the Spencer Rifle Company, in Boston; superintendent of the Robinson

Armory, in the city of New York for building Springfield guns; and also superintendent of the Hicks' Engine Company, of this city, building the engine of which I am the inventor.

1053 I have been frequently examined as an expert in the State courts and in the United States courts in patent causes, and have taken out a large number of patents for myself and others.

Q. 3. Have you read a certified copy of the English letters-patent granted to Anthony Gilchrist, dated Aug. 15, 1867, and marked "Exhibit Gilchrist patent?"

(Objected to.)

A. I have.

Q. 4. Have you examined the model marked "Exhibit Gilchrist machine?"

(Objected to.)

A. I have.

Q. 5. Have you examined a copy of the specifications of the English letters-patent granted to Cornelius Whitehouse, dated in 1845, and numbered 10676, marked "Exhibit part of Whitehouse specification?"

(Objected to.)

A. I have.

Q. 6. Have you examined the model marked "Exhibit Whitehouse machine?"

(Objected to.)

A. I have.

Q. 7. Have you examined the model maked "Bain machine, H. W. B.?"

A. I have.

Q. 8. State whether or not there is in the Bain machine such a stationary press-block or such a movable press-block as is described in the Cawood patent.

A. There is not.

Q. 9. State whether or not there is in the Bain machine such means of combining the stationary press-block and movable press-block as is described in the Cawood patent, and state, previous to answering

1054 the foregoing part of this question, whether you have read and examined the letters-patent granted to Joseph D. Cawood Sept. 9, 1856, upon which this suit was brought.

A. I have examined said patent, and there is not such means of combining the two blocks as described in the Cawood patent.

Q. 10. State whether or not there is in the Bain machine such means of operating the press blocks as is described in the Cawood patent.

A. There is not.

Q. 11. State whether or not there is in the Bain machine such a mode of operation as is described in the Cawood patent.

A. There is not.

Q. 12. State whether or not there is anything in the Bain machine which is described as the invention of the patentee in the Cawood patent

A. There is not.

Q. 13. State whether or not the Bain machine is substantially like or substantially unlike the machine described in the Cawood patent. Answer in respect to its parts and its mode of operation, and give your reasons for your conclusions.

A. It is substantially unlike. My reasons are as follows: In the Cawood machine, so-called, the jaw D, which is described as a permanent jaw, making part of the anvil, is firmly attached or cast with said an-

vil. The movable jaw is described as having its motion given to it by an apparatus attached to said anvil and moving this movable jaw upon the anvil, so that when the two jaws approach each other they may clasp the rail which has been placed between them vertically, and to hold it there firmly as in the jaws of a vise, which I may term an anvil-vise. This fixed jaw and this movable jaw are to be so firmly connected and combined with the anvil, that, when the eccentric cams have fastened the movable jaw in its position, clasping the rail, they both become, as it were, a part of the anvil, and so firmly are they fixed, that hammering
1035 may be done upon the top of the rail without changing the form of the rail between and under the jaws, and to present what would be a true anvil-surface, or swage-block, and having the firmness and the capacity for resistance that the anvil itself has before the jaws are closed. I find described in the patent an improvement upon the common anvil or swage-block. I find the jaws of the anvil not only shaped to the side of the rail, but also having such shape continued as wide as the anvil or swage-block, and made capable of sustaining at least six inches of the head of the rail. This extension of the part of the jaw which is conformed to the rail is a necessity to the manner of using said swage-block and fixtures, and is as necessary to the mending of the rail by putting on a patch upon its upper surface, or crown, as is its conformation and solidity. I consider, also, that the means for holding and moving up the movable jaw, to be made substantially like the patent, must be capable of sufficient movement to allow the rail to be placed in vertically between the jaws, and to be held there by the apparatus itself, so that it cannot back out when the blows are struck by the hammer or swage on the top of the rail. In the Baine machine I find no anvil, for I cannot call a roll in a rolling-machine an anvil. I find no stationary jaw, for I cannot call a small roll placed upon the side of the rail substantially a jaw, as described in the Cawood patent, when it has no other characteristic in common with said stationary jaw than that its periphery is shaped to conform to the sides of a rail. I consider that there is no movable jaw in the Bain machine for the same reason.

I find in the Bain machine a small shaft in bearings, with cams, used at times to give motion to the frames holding the roll on one side of
1056 the machine; in this respect there is a slight similarity to the means employed in the Cawood machine to move up the movable jaw in that machine, but I do not consider it substantially the same means. I consider the Cawood machine to be what I would call a shop fixture, for the purpose of holding the end of a rail as in a vise to be operated upon by hand; and I consider the Bain machine essentially different, as it performs the work which is performed by hand when the rail is held in the Cawood fixture.

The process of putting a rail between the jaws of the Cawood machine, and fastening it there, is all that the machine does in its mode of operation; and if the rail should be left there to cool, it would remain in the same shape that it was when it was put in. In the Bain machine the rail cannot be introduced and passed through it without doing its work, so that the mere introduction of the rail with the Bain machine, and taking it out, is the whole of the work done upon the rail by the Bain machine. Again, the Bain machine operates upon the metal of the rail in substantially a different manner—that is, by rolling it—and the Bain machine is substantially a set of rolls combined in a manner substantially its own, whereas the Cawood machine, or fixture, is simply an anvil improved for the purpose of assisting in the process of forging on a patch under a hammer.

Armory, in the city of New York for building Springfield guns; and also superintendent of the Hicks' Engine Company, of this city, building the engine of which I am the inventor.

1053 I have been frequently examined as an expert in the State courts and in the United States courts in patent causes, and have taken out a large number of patents for myself and others.

Q. 3. Have you read a certified copy of the English letters-patent granted to Anthony Gilchrist, dated Aug. 15, 1867, and marked "Exhibit Gilchrist patent?"

(Objected to.)

A. I have.

Q. 4. Have you examined the model marked "Exhibit Gilchrist machine?"

(Objected to.)

A. I have.

Q. 5. Have you examined a copy of the specifications of the English letters-patent granted to Cornelius Whitehouse, dated in 1845, and numbered 10676, marked "Exhibit part of Whitehouse specification?"

(Objected to.)

A. I have.

Q. 6. Have you examined the model marked "Exhibit Whitehouse machine?"

(Objected to.)

A. I have.

Q. 7. Have you examined the model maked "Bain machine, H. W. B.?"

A. I have.

Q. 8. State whether or not there is in the Bain machine such a stationary press-block or such a movable press-block as is described in the Cawood patent.

A. There is not.

Q. 9. State whether or not there is in the Bain machine such means of combining the stationary press-block and movable press-block as is described in the Cawood patent, and state, previous to answering

1054 the foregoing part of this question, whether you have read and examined the letters-patent granted to Joseph D. Cawood Sept. 9, 1856, upon which this suit was brought.

A. I have examined said patent, and there is not such means of combining the two blocks as described in the Cawood patent.

Q. 10. State whether or not there is in the Bain machine such means of operating the press blocks as is described in the Cawood patent.

A. There is not.

Q. 11. State whether or not there is in the Bain machine such a mode of operation as is described in the Cawood patent.

A. There is not.

Q. 12. State whether or not there is anything in the Bain machine which is described as the invention of the patentee in the Cawood patent

A. There is not.

Q. 13. State whether or not the Bain machine is substantially like or substantially unlike the machine described in the Cawood patent. Answer in respect to its parts and its mode of operation, and give your reasons for your conclusions.

A. It is substantially unlike. My reasons are as follows: In the Cawood machine, so-called, the jaw D, which is described as a permanent jaw, making part of the anvil, is firmly attached or cast with said an-

vil. The movable jaw is described as having its motion given to it by an apparatus attached to said anvil and moving this movable jaw upon the anvil, so that when the two jaws approach each other they may clasp the rail which has been placed between them vertically, and to hold it there firmly as in the jaws of a vise, which I may term an anvil-vise. This fixed jaw and this movable jaw are to be so firmly connected and combined with the anvil, that, when the eccentric cams have fastened the movable jaw in its position, clasping the rail, they both become, as it were, a part of the anvil, and so firmly are they fixed, that hammering
1035 may be done upon the top of the rail without changing the form of the rail between and under the jaws, and to present what would be a true anvil-surface, or swage-block, and having the firmness and the capacity for resistance that the anvil itself has before the jaws are closed. I find described in the patent an improvement upon the common anvil or swage-block. I find the jaws of the anvil not only shaped to the side of the rail, but also having such shape continued as wide as the anvil or swage-block, and made capable of sustaining at least six inches of the head of the rail. This extension of the part of the jaw which is conformed to the rail is a necessity to the manner of using said swage-block and fixtures, and is as necessary to the mending of the rail by putting on a patch upon its upper surface, or crown, as is its conformation and solidity. I consider, also, that the means for holding and moving up the movable jaw, to be made substantially like the patent, must be capable of sufficient movement to allow the rail to be placed in vertically between the jaws, and to be held there by the apparatus itself, so that it cannot back out when the blows are struck by the hammer or swage on the top of the rail. In the Baine machine I find no anvil, for I cannot call a roll in a rolling-machine an anvil. I find no stationary jaw, for I cannot call a small roll placed upon the side of the rail substantially a jaw, as described in the Cawood patent, when it has no other characteristic in common with said stationary jaw than that its periphery is shaped to conform to the sides of a rail. I consider that there is no movable jaw in the Bain machine for the same reason.

I find in the Bain machine a small shaft in bearings, with cams, used at times to give motion to the frames holding the roll on one side of
1056 the machine; in this respect there is a slight similarity to the means employed in the Cawood machine to move up the movable jaw in that machine, but I do not consider it substantially the same means. I consider the Cawood machine to be what I would call a shop fixture, for the purpose of holding the end of a rail as in a vise to be operated upon by hand; and I consider the Bain machine essentially different, as it performs the work which is performed by hand when the rail is held in the Cawood fixture.

The process of putting a rail between the jaws of the Cawood machine, and fastening it there, is all that the machine does in its mode of operation; and if the rail should be left there to cool, it would remain in the same shape that it was when it was put in. In the Bain machine the rail cannot be introduced and passed through it without doing its work, so that the mere introduction of the rail with the Bain machine, and taking it out, is the whole of the work done upon the rail by the Bain machine. Again, the Bain machine operates upon the metal of the rail in substantially a different manner—that is, by rolling it—and the Bain machine is substantially a set of rolls combined in a manner substantially its own, whereas the Cawood machine, or fixture, is simply an anvil improved for the purpose of assisting in the process of forging on a patch under a hammer.

The Bain machine is substantially different from the Cawood machine for the reason that the rail is not held at all for the purposes of mending it even by the side rolls for I consider *that* the side rolls set as guides; and as rolls for re-formation of the rail as much as the lower and upper rolls, although they do not require the same amount of solidity. The under roll and the upper roll of the series in the Bain machine,
1057 and those to which the powers are applied, are the largest in diameter, and they move with about the same speed; they are the only means by which the rail is carried along, and when the rail is first introduced into the machine, they are the ones that seize it, and before that part of the rail which is first seized by the large rolls reaches the centre of said rolls, or a plane passing vertically through the centres of all the rolls, their work is accomplished, and before the rail in entering reaches the side rolls, which are smaller in diameter, the rail can be thrown out of shape, and the crown of the rail forced nearer to the base of the rail, so that the side rolls, if made to conform to the sides of the rail in its natural position, must re-form it; so that it will be seen that the rolling of the patch upon the rail is done principally at a point where the side rolls do not sustain it and cannot confine it. The reason for this is to be found in the different diameters of the rolls. The side rolls are moved along by their contact with the rail at their largest diameter, and, as the rail moves by contact with the larger rolls, and receives substantially their speed it will be seen that any point in the sides of the smaller rolls, nearer their centres than the part which rests upon the perpendicular or vertical portion of the rail, must move slower than the larger rolls, and, consequently, if these small rolls should be forced against the top of the lower roll, as shown in the Bain model, the speeds at the point of contact being different, if said rolls rest on the lower roll firmly, its surface must be milled or cut away, so that if we could call the lower roll an anvil, and the side rolls jaws, they could not be combined as they are combined in the Cawood patent, nor could they for any length of time touch each other with pressure applied to them on the top without wearing away. It is hardly reasonable to sup-
1058 pose that, if the side rolls in the Bain machine were intended to act as the jaws of an anvil or square block, making substantially a part of an anvil when in operation, they would be the smallest portions of the operating parts of a machine, and fixed upon slender supports, small, indeed, when compared with the lower and upper rolls. I therefore find the Bain machine substantially different both as to its parts, their combination, and their mode of operation, from the machine described in the Cawood patent.

Q. 14. Could or not rails be mended in the Gilchrist machine by rolling?

(Objected to.)

A. They could.

Q. 15. What substantial element, if any, is there in the Bain machine which is not found in the Gilchrist machine?

(Objected to.)

A. If I understand what is meant by substantial element, there is none. I find four rolls in the Gilchrist machine combined to operate upon material placed between them, and I think, from the directions given in the patent, it would be proper to shape the peripheries of those rolls to any form which we might desire to roll. I do not think that the Gilchrist machine would be as convenient to use for repairing rails as the Bain machine; but I think, without invention, the rolls could be made adjustable to each other by a simple arrangement of levers; for we

find space left in the housings for the boxes for this purpose, and set-screws for such adjustment, and they could be easily made to move by levers more rapidly and through a greater range. The rolls are all driven in the Gilchrist machine by power, and all have substantially the same speed, which in some respects might be an advantage. I find
1059 also that the Gilchrist machine is arranged with the plane of the centres of the rolls in a horizontal position, but I do not think it would require invention to tip it up if we wish to run railroad-rails through it.

Q. 16. State whether or not a rail could be successfully mended by pounding, by the use of the Bain side rollers and the bottom holder to hold it; and if you say it could not, give your reasons for your answer.

(Objected to.)

A. It could not, for the reason that if a rail was placed on the under roll and the two small rolls upon the side were brought together far enough to come in contact with the sides of the rail, theoretically, this lower roll and the two side rolls would touch the rail in lines only, having no width of contact whatever, and, practically, a very short bearing. If, now, the rail be heated and a patch put on it preparatory to hammering, and a blow be struck upon a swage by a hammer directly over this line of contact, the metal of which the patch is composed would be forced out of shape, and with portions of the top of the small roll cut away to fit the under side of the crown of the rail, and as far as the said metal came in contact with such portion of the small roll it would take their shape, and if the blow were a heavy one, the rail would be forced down on the upper side of the lower roll and cause the rail to partially assume its shape, and probably curve the rail before the line of contact and behind it, in a perceptible manner. If now the rail should be moved, and its position changed, so that another part could come in this line of contact, and another blow should be given to the top of the rail, the same conformation would be shown upon it, so that the part of the rail attempted to be mended would present a series of circular indenta-
1060 tions and projections which could not be taken out again completely, except by rolling it or drawing it through a die as wire is drawn, and I believe that there would be more work required to repair the rail after this process had been gone through, than would have been required before the rail had been thus disfigured.

Q. 17. How is it with the two jaws and the anvil in the Church machine, respecting their holding a rail so that it be successfully mended by hammering?

(Objected to.)

A. If the upper portion of the Church machine be removed, and the rail that is put on it is high enough with its patch to stand above the jaws, the patch could be successfully welded on and shaped with a swage by hand.

Q. 18. What do you say as to whether or not the jaws of the Whitehouse machine would hold a rail so that it could be successfully mended by pounding?

(Objected to.)

A. If the sides of the jaws of the Whitehouse machine were made to conform to the shape of a rail, or if the shape shown in the drawings be used for a rail, a rail could be mended by pounding upon a patch in the Whitehouse machine when the revolving pounder was removed. As I have never seen such a revolving pounder as is shown in the drawing, in operation, I do not know whether that could be used to mend a rail, but perhaps it might.

Q. 19. Could the two side rollers, and the lower roller of the Bain machine, be successfully substituted for the clamps in the Cawood machine?

A. They could not.

Q. 20. Why not?

A. In the first place, if a patch was put on to a rail placed between them and blows should be struck upon the top of the patch, it would drive the metal into the shape of the rolls in a similar manner to that
1061 referred to by me when speaking of the Bain machine, under similar circumstances, and, although the bottom of the rail might not be bent, the same irregular surfaces would be shown on the under side of the crown of the rail as would be shown when a rail was placed in the Bain machine and hammered upon as before referred to. Neither have the rolls sufficient solidity to perform their part and to take the place of an anvil jaw.

Q. 21. State whether or not the machine represented by the model "Exhibit Michigan Southern," or a machine represented by model "Bayonet vise," or a machine represented by model "Beebe & Smith block," would contain, substantially, such a stationary press-block or jaw, or substantially such a movable press-block or jaw, as is described in the Cawood patent.

Examination adjourned by consent, to Tuesday, May 14th, 1872, at 9 a. m.

NEW YORK, *May* 14, 1872—8½ a. m.

Present: Counsel as before, and complainant in person.

A. I think they would not.

Q. 22. State whether or not a machine represented by the model "Michigan Southern," or a machine represented by the model "Bayonet vise," or a machine represented by the model "Beebe & Smith block," would contain substantially such means of combining and operating the press-blocks or jaws as is described in the Cawood patent.

A. They would not.

Q. 23. If the Cawood patent be so construed as to exclude from it the angle-iron machine, represented by the model marked "X. E. A. D. U. S.," for the reason that the iron held by it did not rest upon the anvil, then would, or not, mending rails by the use of such a machine as is repre'ented by model "Illinois Central R. R. Co. machine," or
1062 such a machine as is represented by the model "Exhibit Michigan Southern," or such a machine as is represented by the model "Bayonet vise," be within the patent, assuming that the recess between the jaws be so removed as to give no support to the bottom of the rail?

(Objected to.)

A. They would not, in my opinion.

Q. 24. If the bottom of the recess between the jaws in machine represented by model "Illinois Central R. R. machine," or the model "Bayonet vise," or the model "Exhibit Michigan Southern," be so removed as to give no support to the bottom of the rail, which would those machines then be most like, the angle-iron machine represented by model marked "X. E. A. D. U. S.," or the machine described in the Cawood patent?

(Objected to.)

A. The angle-iron machine.

Q. 25. If the Cawood patent be limited to a combination, one of the elements of which is an anvil giving support to the bottom of the rail, then would a machine like the model "Ill. C. R. R. Co. machine," or like the model "Bayonet vise," or like the model "Michigan South-

ern," so constructed and used that the bottom of the rail does not touch anything while being mended, be within the Cawood patent?

A. It would not, in my opinion.

Q. 26. State whether or not you have examined a copy of the De Bergue, English patent No. 13493, and of Adams' English patent No. 13653, both dated in 1851, in reference to the forms of rails represented in the drawings of those patents.

(Objected to.)

A. I have.

1063 Q. 27. Look at model marked "Defendants' Exhibit De Bergue Angle-Iron Rail," and state whether or not that model is in conformity with what is represented in patent No. 13493.

(Objected to.)

A. It is substantially.

Q. 28. Look at model marked "Defendants' Exhibit Adams Angle-Iron Rail," and state whether or not that model is in conformity with what is represented in patent No. 13653.

(Objected to.)

A. It is substantially.

WM. C. HICKS.

Subscribed and sworn to before me this 14th day of May, 1872.

WM. CLITUS WITTER,
Notary Public N. Y. Co.

The witness JOHN BOYD ELIOT, being examined on redirect by Geo. Gifford, deposes and says as follows:

Red. Q. 254. In C. Q. 136, 137, 138, 139, and 140, I notice the words "Cawood's invention" and "Cawood's contrivance" are used. In answering those questions did you or not understand that those words referred to the Cawood contrivance described in his patent?

A. I did.

JOHN BOYD ELIOT.

Subscribed and sworn to before me this 14th of May, 1872.

[SEAL.] WM. CLITUS WITTER,
Notary Public N. Y. Co.

Examination further adjourned by consent to Thursday, May 16, 1872, at 9 a. m.

1064 NEW YORK, *May* 16, 1872—9 a. m.

Present: complainant in person, and Harvey Waters, his counsel, and Geo. Gifford, esq., counsel for defendants.

Witness WM. C. HICKS, being further interrogated by Geo. Gifford, counsel for defendants, deposes and says, as follows:

Q. 29. Look at model marked "Defendants' Exhibit Fox-Tire" model and state what it is.

(Objected to.)

A. It represents the holding part of the machine described in an English specification of one Fox dated Feb. 24, 1847, and numbered 11596. I read the specification in the Astor Library, and examined the drawings connected therewith, and I say it represents a part; that is, the holding part. In addition to what is shown here, the drawing represents a band put around the tire with tugs at each end and an hydrau-

lic apparatus for welding the tire by pressure. I do not see in the patent nor in the drawing any such diagonal cut in the tire-ring. Neither does the description lead one to infer that the tire was cut in the angle represented or shown in the model, but the whole process is described as being one in which the tire is butt-welded, forced together, the jaws, as shown in the model, acting only as holders, as I understand. I wish to add also that he says in the specification that he finds by experiment it takes from one to three tons per square inch to weld his tire in this manner.

Q. 30. Please explain its operation.

(Objected to.)

A. I have substantially described its operation already, but I will add that the movable jaw shaped to the outside of the tire and the
1065 fixed jaw shaped to the inside of the tire, both of which are on a bed, the movable jaw sliding on that bed, which is described as of cast iron, are, in addition to their shape in the cross-section of the tire, made to fit the curve of the tire and outer periphery and interior diameter, and that the fixed jaw has a cover or cap to enclose the tire.

And, being cross-examined by Harvey Waters, counsel for complainant, witness deposes and says, as follows:

C. Q. 31. (De bene esse.) Mr. Hicks, I suppose that you read carefully and critically this Fox patent, to which you have referred, dated Feb. 24, 1847, and numbered 11596. Am I correct in this supposition?

A. I tried so to do. I read it over twice, particularly those parts which referred to this machine. There are other machines described in the patent for stamping up shapes which I did not so carefully read.

C. Q. 32. (De bene esse.) Is there any other machine described in that patent which is as much like the Cawood machine, described in the patent upon which this suit is brought, as this tire-welder is like it, which is represented by the model to which you have referred?

A. I don't think there is; my attention was first called to this drawing, and I read the specification more carefully in reference to this than in reference to the others.

C. Q. 33. (De bene esse.) And so you selected this as being the nearest like Cawood's contrivance of anything described in that patent; is that so?

A. I didn't say that this was like the Cawood patent. It struck me that there was a resemblance between this machine and the Cawood patent in some respects. It was not my discovery just. I read it, thinking it was the nearest of anything shown in that patent.

1066 C. Q. 34. (De bene esse.) Did you give directions for the making of this model?

A. I did not.

C. Q. 35. (De bene esse.) Does this model correctly represent the mode of operation of the machine described in that patent for welding tires?

A. I do not think it does, except taken in connection with my explanation, including in the model the specimen of a tire cut diagonally, which I think would lead me to infer without the explanation that the welding was partially to be done by the jaws. I do not understand that to be the case; otherwise, with the exception of the hydraulic arrangement and some other details which do not particularly refer to the jaws themselves, I think it does not represent the jaws and the bed, as far as they are concerned.

C. Q. 36. (De bene esse.) Well, suppose a machine were constructed like the model to which you have just referred, could you patch railroad

rails in it according to the directions in the Cawood patent, upon which this suit is brought?

A. I should say that it could not be done, as the machine now stands, exactly; but by removing the top part of the permanent jaw, and making the jaws straight, you could mend a rail.

C. Q. 37. (De bene esse.) Do you, or do you not, mean to be understood that if a machine were constructed in accordance with what is indicated in this model, or by this model, that you could patch railroad-rails in it according to the directions of the Cawood patent, on which this suit is brought?

A. I do mean to say that they could not, of course, which is what I said before. It isn't pretended they could.

C. Q. 38. (De bene esse.) Will you now state, if you please, whether there is anywhere in that Fox patent to which you have referred,
1067 directions, following which, as a mere constructor, you would be able to build a Cawood machine, such as is described in this patent, upon which this suit is brought?

A. I think not, unless it may be said that the removing of the top of this fixed jaw in this model, as I have before said, might be said to be simply the work of a mechanic; and I should say also that it would require the removal of another part as removed in this model.

C. Q. 39. (De bene esse.) Mr. Hicks, I would like to get your judgment as an engineer of skill, and as a patentee of experience in these matters, in reply to the previous interrogatory, without any if?

A. As a mere mechanical constructor, following the directions of the patent, he could not.

C. Q. 40. (De bene esse.) I wish, now, to get your judgment upon the contrivances described and represented in the English letters-patent granted to Anthony Gilchrist, to which you have referred in your answer to the Q. 3. Could a mere mechanical constructor, following the directions of that patent, construct the Cawood machine, described and represented in the Cawood patent, upon which this suit is brought? I mean, of course, a mechanical constructor skilled in the arts to which that English patent refers.

A. I think not.

C. Q. 41. (De bene esse.) Now, if you please, will you answer the same question in regard to the patent granted to Cornelius Whitehouse?

A. If the Cawood patent is confined to the exact description of a fixed jaw, cast with, or attached permanently to, an anvil which has a horizontal anvil surface for the movable jaw to slide upon, and a movable jaw which is arranged to slide upon that horizontal surface, and by means substantially the same as is described in the patent which hold the jaws together firmly, then I should say that a mechanic, using only mechanical skill without any invention whatever, could not make
1068 a Cawood machine from the Whitehouse patent; but if the Cawood machine be interpreted to mean a jaw, made firm, without an anvil for the movable jaw to slide upon, in the manner described in the patent, and such movable jaw made to move in any line, by any means, so *so* to clasp the rail, then I should say that he could make it from the Whitehouse patent, of course leaving off the upper pounder.

C. Q. 42. (De bene esse.) I think you hardly answer the question. I do not ask you to construe the Cawood patent. I mean to ask you simply whether a constructor, skilled in the matters to which the English patent to Whitehouse refers, and following the directions therein contained, could, in following those directions, construct the Cawood machine described in the patent, on which this suit was brought, and

having the mode of operation set forth in that patent for patching railroad rails?

A. I was not aware that I had undertaken to construe the Cawood patent; I simply said if it were so construed. In order to compare two machines, it is necessary for even a mechanic, in reading a specification, to construe the language of that specification, as far as the description goes, in order to find out what to do, without interfering with the claims, which I understand to be within the province of the court. If the exact directions, given in the Cawood patent, as referred to in the first part of my previous answer, and such a machine, with such parts, and such means of operating, as is there described, were the only information which he could draw upon, I say that such a description is not the one given in the Whitehouse patent; but, as far as the man is concerned, to whom this specification is supposed to be addressed, I understand that he should be a blacksmith, capable of working upon
1069 long bars of iron, at a welding-heat, and so far as that goes he would be properly instructed in the art to which the Cawood patent belongs.

C. Q. 43. (De bene esse.) Will you now answer the question, which I understand to be this: Could a constructor, skilled in the matters to which the English patent to Whitehouse refers, conforming to the directions therein contained, construct the machine described in the Cawood patent, on which this suit is brought?

A. Taking into consideration my previous explanations as to what I understand the Cawood machine to be, I answer no.

C. Q. 44. And now, will you be kind enough to tell what you understand the Cawood machine to be, as briefly as possible?

A. I understand the question to refer to what Cawood says his machine is in his patent, only—not as to what opinions may be expressed as to what modifications could be made, and still have what he claims in his patent interpreted by the court, or any one else; and I understand that machine, as described, is an improvement upon a common anvil, or swage-block, having a solid jaw which makes part of that anvil, or I should say that the fixed jaw is described as a solid block, making part of the anvil. I understand, also, that the face of the anvil is to extend far enough from the fixed jaw to receive the movable jaw and its apparatus for moving it, and to be sufficiently solid to hold the movable jaw firmly under the blows that may be given to it by a hammer, and that the holding apparatus and moving apparatus, both, should be such that they make, together with the fixed jaw and anvil, a substantial fixture, to hold and sustain the rail being patched, so that there shall be no yielding, or backing out, in any direction.

C. Q. 45. Do you understand the machine described in the Cawood patent as it is there described?

1070 A. I think I do, though I think there is some ambiguity in the description, which leads to a variety of opinions as to its exact meaning in some parts of the machine; and I think there are some difficulties which a practical mechanic would be troubled with if he undertook to carry out that exact description as to the method of using the machine after it was made; for I understand that if that patent was exactly followed, a man must determine what is the natural position of the rail, and, if he follows the drawings exactly, he would fit it exactly to some one rail, and he would find, in his experience in using the machine, if he was to use it on more than one rail, that hardly two rails were made alike; the rails short as to depth would not, perhaps, touch the bottom; the rails that were a little curved would not fit the jaws in

all respects, and there might be other irregularities—so that, if he intended in the first place that one rail should rest upon the anvil, between the jaws, to sustain it against the blows of the hammer, and fitting the exact conformation of the rail on its side, and, if he understood that this fitting of the rail upon its sides, exactly, was absolutely necessary to the mending of the rail, then, when a rail did not touch on the bottom, he would find that that part of the conformation of the jaws to the shape of the rail, like the one shown in the patent, which is below the narrowest point in the upright part, vertical part of the rail, would be of no use at all, as far as the sustaining of a rail below this point is concerned; but I don't think it would be fair to suppose that Cawood intended, as a practical machine, to make it so that ordinary rails, of substantially the shape for which the machine was constructed, should be made to be used exactly as shaped in the patent, and therefore that, whether the rail rested on the bottom or not, it would be his machine.

1071 C. Q. 46. I understand you, then, in your last answer—you would know how to make the machine described in Cawood's patent from the patent itself. Am I right?

A. I would know how to make a machine for mending rail, from the description in the Cawood patent. Whether it would be the machine that Mr. Cawood exactly intended, or not, I should not be absolutely sure, though I think I have given a fair statement of what I understand the directions to be in my previous answer.

C. Q. 47. I didn't ask you what Mr. Cawood intended to describe, but what he did describe in his patent, and whether you understood it. Now, do you, or do you not, mean to say that the directions in the patent of Cawood are sufficient to enable you to make from them (not a machine but) the machine which that patent undertakes to describe?

A. I mean to say that I have an understanding of the patent, as it appears to my mind, and that I could make the machine which it appears to me is described in that patent, of course using my judgment.

C. Q. 48. In your answer to C. Q. 45, you say, "I think there are some difficulties which a practical mechanic would be troubled with, if he undertook to carry out that exact description as to the method of using the machine after it was made."

Q. Will you be kind enough to specify what those "some difficulties" are, referring to the patent, if you please?

A. He says that the machine is "for the purpose of welding up and re-forming the ends of railroad-rails." Then, further down, in speaking of the block D, he says, "With its farthest edge also shaped to fit the side of the rail, when it lies across the anvil in its natural position."

Now, as it is well known that rails vary, although intended to

1072 be alike, if the machine is made to fit exactly the sides of one rail when resting in its natural position and if the mechanician interpret the word natural position to mean lying horizontally, with its lower flange resting on the anvil, and he then attempted to mend railroad-rails, expecting that they would rest all of them on the bottom, and all of them fitting both jaws, he would find that some would fit the jaws and rest on the anvil in its natural position, perhaps, and some would not.

C. Q. 49. Do you see any other difficulties in the description of the patent which would be likely to trouble the mechanician?

A. I do not now.

C. Q. 50. The first quotation you have made from the patent merely

states the purpose of the machine, does it not, without undertaking to describe it at all?

A. It does; and that is why I referred to it in reference to its use for the mending of railroad-rails, in contradistinction to mending and filling only one rail.

C. Q. 51. Mr. Hicks, you are undoubtedly familiar with the process of making rails, are you not?

A. I think I am.

C. Q. 52. When the rolls are once set, in the process of making rails, is it or is it not common to run off a great many rails without making any adjustment or change in the rolls?

A. It is, unless the man who *guages* them finds them varying too much. In that case, the adjustment is made, and it is a well-known fact to workers in iron, by rolling, that the difference in heat and the difference in the quality of the iron, although the rolls may have the same adjustment, will make a constantly-changing weight of rail within, however narrower bounds, than the adjustment of the rolls to each other would make. Another cause of variation, is often owing to the scanty stock in the piece rolled where the material is full, causing
1073 the rolls to labor more, and to spring apart more than when the stock is scanty.

C. Q. 53. In the first place, be kind enough to say what you mean by "var'ing too much," in your last answer.

A. There's always some latitute given in rolling shapes of any kind, whether it would fit the *guage* tightly or loosely, and there is a limit as to what would do and what wouldn't do, generally given by the superintendent of the mill to the workmen, as it would be practically impossible to roll all exactly the same size.

C. Q. 54. The inquiry here is particularly about rails. Now, sir, in the rolling of such rails as that described and represented in the Cawood patent, is it not true that the shape of those sides of the rail which are to fit the jaws of the patent are determined by the shape of the grooves in the rolls without regard to their adjustment, so long as they are so adjusted as to make the rail fill the groove?

A. The grooves in the rail are shaped by the swell in the roll; and the head of the rail and flange of the rail are formed by corresponding grooves in the roll, the pressure brought to bear by the upper roll upon the material of the rail, in the groove of the rail, by the swell of the roll, forces the material of the rail into the groove of the roll, and also spreads the rail between the top of the rail and the bottom of the flange, so that all parts, if there is iron enough, shall be full. Now, if the upper roll does not come down hard enough upon this metal and spread it into the grooves as I have indicated, so that the iron shall fill the grooves full, the rail will not be formed completely upon its top and completely on its bottom, and, therefore, the pressure of the upper roll and its adjustment is all-important in completely and accurately shaping the sides as well as the face.

1074 C. Q. 55. Do you think you have answered C. Q. 54?

A. I thought I had. I will read it again and see.

(The magistrate reads the question.)

Witness continues: I have answered more than I need to have done to answer the question, yet I think I have answered it; but I will further say, if we have a bar of iron sufficient to make a rail, the rolls must be so adjusted that the rolls must come together while forming the groove referred to in the rail, for, if they stood apart any perceptible distance, there would be a fin formed both on the head of the rail and also on the

bottom of the flange, and the top of the rail would not be completely formed unless the rolls were adjusted nearer together.

C. Q. 56. I call the attention of the witness to the question C. Q. 54, which is in these words: "In the rolling of such rails as described and represented in the Cawood patent, is it not true that the shape of those sides of the rail which are to fit the jaws of the patent are determined by the grooves in the rolls without regard to their adjustment, so long as they are so adjusted as to make the rail fill the groove?"

A. As far as the shape of the sides of the rail is concerned, without reference to that portion of the side of the rail which reaches to the center of the crown of the top of the rail, making the rail thinner or thicker, this is true.

C. Q. 57. Now, then, having got so far, is it not true that a thousand rails, as rolled consecutively in the manufacture of rails, will have all their sides the same, so that if one of them would fit the jaws in the Cawood machine, they all would, one after another?

A. If you take the jaws separately before they are closed, and speak only of their shape, and that they are all of the same depth,
1075 making the lower flange of all of them the same thickness, they would.

C. Q. 58. Will not a thousand rails, as they are usually rolled consecutively, have the same depth of base?

A. I think not.

C. Q. 59. Why not?

A. For I have frequently measured rails, selecting them where a large lot were together, and I know that they do come very materially different in their depth, and, in laying track upon a railroad, a lot of rails coming in one shipment together sometimes shows a considerable variation, both as to the width of the bottom flange and to the height of the rail.

C. Q. 60. I haven't asked you how rails usually come by shipment, nor have I asked you how rails may vary as to their breadth of base when rolled consecutively. What I wish to know is, if in a rolling-mill, such as is commonly used in rolling rails, a thousand rails be rolled consecutively in the same groove, whether all of those rails will not have the same depth of base?

A. It is my opinion that they would not.

C. Q. 61. Why not?

A. Substantially for the reasons that I have given before; but the best reason I can think of, without knowing positively what is the reason, is that some rails are rolled hotter than others, and would shrink in cooling, differently. There may be other reasons as to completely filling the bottoms of the sides which form the bottom of the rail. It is a very difficult question to answer why such a thing happens, but all railroad men know full well that such variations in rails are discovered when we come to use them, and that is the way I understand they are to be repaired by the Cawood patent.

C. Q. 62. Do you mean to say that you do know the reason, or that you don't know the reason, which?

A. I mean to say that I think I have given some of the reasons,
1076 perhaps not all. Another reason may be the difference in stock. I therefore mean to say that I do know, I think, one reason or more.

C. Q. 63. Do you know any reason which you have not stated?

A. Not that I now think of.

C. *U.* 64. Now, sir, do you not know that in the rolling of such rails

as the one described in the Cawood patent, that one of the rolls is turned so as to fit the rail all the way upon one side, and all the way across the bottom, just the same as the Cawood jaw that is solid with the anvil, and the anvil itself fits the side and bottom of the rail, with the single exception that in the rolling-mill the roll fits the rail clear around the top of the rail, while in the Cawood machine it fits no further around than to the centre of the crown of the head of the rail, that be the only difference?

A. I never have seen a set of rolls, to my knowledge, either in the roll itself, or in the drawing, where the whole bottom of the rail is formed by one roll, but it may be so, nevertheless. If there are such rolls, the shape of the fixed jaw, taken in conjunction with the face of an anvil parallel with the bottom of the rail shown, I should say would correspond in the manner supposed in the question.

C. Q. 65. Do you think that a mechanician undertaking to follow the instructions in the Cawood patent would have any difficulty in so shaping the jaws and the anvil in their relation to each other as that the jaw should fit the side of the rail when it was laid in its natural position on the anvil?

A. Supposing its natural position to be resting on the anvil, I don't think there would be any difficulty in its fitting the jaw, if he undertook to.

C. Q. 66. Well, sir, now one word as to this matter of position.
1077 What do you understand to be the "natural position" of such a rail as that described in the Cawood patent?

A. I do not know what he means by natural position. I suppose it may refer to the position of the rail in use under a locomotive, for that is its natural position, and yet, that position of rails varies in almost every rail, except on a dead level track, for in curves and on grades the rail is both tipped up endwise and thrown over sidewise to counteract the centrifugal force of the train; so that if he means natural position on a railroad, he means most any position that a rail could be used in, and yet it would be substantially horizontal.

C. Q. 67. Is it not the natural position of such a rail as that described in the Cawood patent, that it should rest upon its base?

A. That is true in reference to portions of the rail.

C. Q. 68. Well, what portion of it is it not true of?

A. That portion which we unite by the first joint, where there is no tie placed under the joint, for although it may be said that the body of the rail rests upon the tie, yet it is not supported under its whole length by the tie.

C. Q. 69. Did you ever see a rail supported under its whole length by the tie?

A. I have, but that is not the common use of them. It would not be the natural position.

C. Q. 70. Is not the rail in the Cawood patent represented as resting upon its base upon the anvil?

A. I think it is represented as touching the anvil, but not the whole rail resting upon it.

C. Q. 71. We will go back now, for a moment, to the rolls which are in common use for rolling railroad-rails. In answer to C. Q. 64, you say, "I never have seen a set of rolls, to my knowledge, either in the roll itself or in the drawing, where the whole bottom of the
1078 rail is formed by one roll." Did you ever see any roller is use for rolling railroad-rails that were not so made?

A. As to the shape of rolls for rolling railroad-rails, I obtained my

information mostly from books, and therefore I have not seen much rolling of railroad-rails, practically, at all; although I think I have seen railroad-rails rolled, but I did not examine closely whether the lower flange was made in the manner referred to; but, judging from my knowledge of rolling other things, I should say it would be a very unpractical way of rolling a railroad-rail to put it all in the lower roll, and for this reason, as near as possible, the speed of the rolls, where they come in contact with the iron to be rolled, should be equal, and, in order to obtain this equality of speed, it is very desirable that as much of the shape should be formed in one roll as in the other, so that there shall not be any drawing action more in one part of the metal than in the other.

C. Q. 72. Then, with your general knowledge, you would have one-half of the rail in one roll and the other half in the other roll, would you not?

A. I would.

C. Q. 73. Would not such rolls be liable to produce fins along the line of the bottom of the rail at the central position?

A. They would, if there was too much stock, but no more so than in the other system referred to, and the head of the rail, what is called its crown, if made rounding, as it usually is, could be made in no other way than as I have described, and rails which are made with their base slightly angling from the outside to the centre, as they generally and frequently are, could be made in no other way. And it is necessary, moreover, in all rolls and dies, to give them a slight angle, or taper, that the iron may freely leave the shape, which in that case, where the whole rail was made in the lower roll—the bottom of the rail and
1079 all—if used with a taper, would make the rail stand a little angling. I am not sure that the rail described in the Cawood patent was made in rolls that had any taper, but I know that it is common to have this slight angle upon the bottom of railroad-rails.

C. Q. 74. Do you mean to say that it is common in such rails as that described in the Cawood patent to have the base of the rail or its bottom beveled each way from the centre, so that a straight rule would not fit it when laid across it?

A. I do not; for if that rail was rolled in the manner supposed, the whole bottom being made in the lower roll, the rule would fit it if laid across it.

C. Q. 75. Did you ever see any rails of that general character beveled on the bottom?

A. I have. I mean by that general character what is called a T or H rail.

C. Q. 76. Do you see any among all the models here present that are beveled on the bottom?

A. Most of them are nearly flat on the bottom. I find one bottom of a double-headed rail, but not a T-rail—more in the form of an H—that is, made rounding both on the top and bottom.

C. Q. 77. (De bene esse.) What does that one represent?

A. It is not marked, but I suppose it belongs to the Church machine model.

C. Q. 78. (De bene esse.) The Church machine model is one to which you had your attention called in your direct examination, is it not?

A. It is not from the Church machine model to which I referred in my direct examination, but to another Church machine model, representing, I suppose, another part of the Church patent.

C. Q. 79. (De bene esse.) This model of a rail which you say is rounding upon its base, is made to represent a hollow rail, is it not?

A. I think it is.

1080 C. Q. 80. (De bene esse.) Is it made to represent a rail as made in a rolling-mill, or how otherwise?

A. I think it is not. I think it represents a method of squeezing up a rail or hammering it—pressing it.

C. Q. 81. (De bene esse.) Whose method?

A. Church's, I suppose.

C. Q. 82. (De bene esse.) Did you ever see any such hollow rails made by Church's method, or any other?

A. I don't now remember of any. I think I never did.

C. Q. 83. We will return now to the usual method of rolling rails. I believe you say you have never seen rolls working where one of the rolls was made to fit the rail all the way across one side, and also across the bottom thereof, and of course, if you have not, you cannot tell how the other of such a pair of rolls would fit the rails, perhaps; but suppose, if you please, the other roll in such a pair was made to fit all that part which the first roll mentioned by me did not fit, would it not be true then, that if a thousand rails were rolled consecutively in such a pair of rolls, so that the rail as it was rolled would fill the groove entirely, would not all that part of such *such* rails which should fit the movable press-block in the Cawood machine be of the same shape?

A. I do not think that that would necessarily follow, for the reason given before by me, on account of the crankage, which would be different in the different rails, according to the temperature at which they were rolled, and for the best reason of all, in my opinion, that they do vary when cold.

C. Q. 84. Have you any other reasons to give?

A. I have not.

1081 C. Q. 85. Now, sir, will you be kind enough to tell us how you know, then, (for you say you have never seen such rolls,) that a thousand rails so rolled consecutively would vary?

A. I give that as my opinion, for I do not see what difference it makes in reference to the shrinkage of a piece of metal if the shape is the same, whether it is rolled in one kind of a roll or in another. Another reason occurs to me which I had not mentioned before, which might affect the case of a thousand rails, that one thousand rails could hardly be rolled through one series of rolls consecutively, without change of men at the rolls; and I have frequently noticed that different men, with the same dies, would produce different results, and it is hardly the habit of men to go right on from one day to another, one man taking up the work where the other left it off, without making some trifling change or adjustment in the machines used.

C. Q. 86. You have spoken in your last answer at considerable length about trifling adjustments. Would such adjustments make any change in the work as produced by the dies per se?

A. What I mean by trifling adjustments is, slight adjustments according to the judgment of the man using them, and such adjustments would vary the work produced. For instance, one man in rolling would find perhaps, by the spring of the machine and the long-continued use of it, that the rolls had either worn or that the adjusting-screw had been turned in some way, which made the rail too thick. He would naturally turn the screw to make the rail thinner. Then he would try again, put another rail through, and keep on trying till he thought he had got it about right; then he would keep on rolling when he had got it about right, till he imagined it was out of the way again—and, in fact, perhaps, it would be out of the way again—then he would make other changes.

I can give another instance which may explain this matter. I have had a long experience in the rolling of gun-barrels, and it is
1082 very difficult to get a night hand, rolling the very same rolls, to produce gun-barrels that will fit the *guage* in the same manner as the day-roller, and vice versa.

C. Q. 87. I don't care about the gun-barrels now. I think we had better stick to the rails. And now, if you please, I would like your judgment whether, in such a mill for rolling rails as I have described and supposed, where one of the rolls fits one side of the rail around and across the bottom, and the other roll fits the rail around the other side and nearly across the top of the rail, it would be possible for any man, by any adjustment which he can make in such a mill, to change the shape of the sides of the rail in any way, so long as the rail fills the groove?

A. I don't think that the man himself, under those circumstances, could change the shape of the rail; and the only changes that would be made, as far as I can now see, would be that made by the shrinkage of the rail or the wear of the rolls.

C. Q. 88. Would there be any difficulty in a mechanician constructing the movable jaw in the Cawood patent so as to fit the side of a rail, rolled in such a mill as I have supposed, from the bottom of the rail up the side of the rail, as far as the plane of the centre of the crown or head of the rail?

A. I think not.

C. Q. 89. And would there be any difficulty in so constructing the movable jaw that, at the same time it fitted the side of the rail in the machine, the bottom of the jaw would fit down upon the anvil, so that, at the same time that the jaw rested upon the anvil, the rail should, by its bottom, also rest upon the anvil?

A. If what is meant by rest is touch upon the anvil, I answer no; but if it means support the rail entirely, and that the jaws be closed, the part of the rail above the jaw would be supported by the jaws, they, in their turn, being supported by the anvil.

1083 C. Q. 90. You have spoken several times, in the course of your cross examination in this matter of rolling rails as they are usually rolled, about the variation of thickness of the rail, which you say, if I understood you, might take place in consequence of the adjustment of the rolls. How much do you think that might be practically in rolling rails in such a mill as last described by me?

A. In the mill last described by you, and under the circumstances described by you, I think you suppose that no such variation, on adjustment, took place; but in ordinary use I have no doubt a variation would be shown in the rails rolled as to their thickness. How much that variation would be would depend upon varying circumstances, and I couldn't tell how much, but I think that that variation would be found to be considerable when a lot of rails was measured by a *guage*, but I do not think that the variation in thickness would be as much as the variation in depth.

C. Q. 91. We don't seem to understand each other. What are the means of adjustment in the common railroad-mill?

A. Generally, I believe, two screws, with nuts and boxes for loosening the upper roll on pressing it down.

C. Q. 92. Any other?

A. Sometimes they are adjusted by keys. I believe, sometimes by pieces put under the cap and over the upper box. I now refer to rolls in general, with which I am best familiar.

C. Q. 93. I haven't asked you anything of late about rolls in general. What I want you to state, if you know, is in regard to the adjustment of rails in a railroad-mill, as commonly in use in this or any other country. Is there anything more than the perpendicular adjustment of one roll towards and from the other?

A. As far as my information extends, there is not.

1084 C. Q. 94. Well, sir, suppose, if you please, that if one rail was rolled in such a mill, and then the adjusting-screws of the roll turned back one-sixteenth of an inch and another rail were rolled, what would be the difference in those two rails, everything else being equal?

A. That would depend upon the amount of stock and upon the shape of the rolls. Raising up the upper roll a sixteenth of an inch would make the rail a sixteenth of an inch thicker in the first point of contact of the roller, and probably a sixteenth thicker all through the rail in vertical lines; the scant portion probably would be the bottom and top of the rail, if the metal was short, but it would be very difficult to decide what would be the exact effect on all parts of the rail without trying.

C. Q. 95. Would there be any other difference, provided the rail fitted the groove in both instances, with the exception that the rail would be one sixteenth of an inch thicker in the last instance than in the first?

A. As far as the rolls go, I think not.

C. Q. 96. Now, sir, in your judgment, would it make any difference in the operation of the Cawood machine as described in his patent, whether you put one or the other of the rails last referred to into it for the purpose of putting on a patch, recollecting, of course, that the increase of thickness of one rail as compared with the other, which was in a vertical direction in the rolling-mill, would be in a horizontal direction in the Cawood machine?

A. Providing the eccentric of the machine were set to pinch the widest rail and the narrower rail was put in, the jaws wouldn't touch the narrow rail at all.

C. Q. 97. Now, sir, turn it about, if you please, and suppose the eccentric in the machine set so as to pinch the thinner rail, then how would it be with the thicker one?

1085 A. The eccentric would not be able to come down to its dead point, if the rail was a sixteenth thicker, in the proportion of the difference between the sixteenth of an inch and the length of circumference of the circle of the eccentric required to move that sixteenth of an inch in a horizontal line. It probably would hold the rail so that a patch could be put on the wide rail without backing out, so as to allow the jaws to open when a blow was struck on the top of the rail, but it would not hold it as positively or as firmly as it would the narrow rail.

C. Q. 98. Is there such a thing as an eccentric described or mentioned in any way in the Cawood patent?

A. There are two eccentric cams described and shown in the drawings, and I would as leave use the words eccentric cam as the word eccentric in my last answer.

C. Q. 99. Is not an eccentric cam a very different thing from an eccentric in mechanical language, and is it not a very different thing in fact?

A. There is no such thing as an eccentric used as a noun to express a piece of machinery properly so used, unless it may be that which is used in reference to an eccentric piece revolving around a center, with a strap for giving motion, as in a steam engine for working the valves. All other uses of an eccentric would be in the manner of a cam, and I understand an eccentric cam to mean a cam formed substantially of a circle, either revolved or reciprocated upon a center, to which the cam

is eccentric; in other words, their centers being at different points in the line of the diameters.

C. Q. 100. I accept your interpretation so far as relates to the fact that in the steam-engine the part which usually works the valve is an eccentric, and, with that understanding, please say if there is any such thing in the Cawood patent.

1086 A. There is no such eccentric as that, but I understand that there are eccentric cams as described in the record part of my previous answer.

Q. 101. I accept what you say about the eccentric cams in Cawood's patent, because if they were not eccentric, they would not be cams. But you said something about dead points. Is there any such words as dead point or dead points in the Cawood patent?

A. All cams are eccentric, but all cams are not eccentric cams, for the reason that an eccentric, when used with the word cam, designates a peculiar kind of cam, that is, a cam whose periphery is a circle, and as a circle placed upon a different centre from the shaft on which it works when brought against a surface acting as a cam, which surface is perpendicular, or at right angles to the diameter which passes through their two centers, there is, necessarily, a dead point, and such I understand to be described in Cawood's patent, as shown in the drawings.

C. Q. 102. Will you now be kind enough to answer the question, which is, is there any such words as dead points in the Cawood patent?

A. There is not, in terms.

C. Q. 103. Are there any such words in juxtaposition as eccentric cams in the Cawood patent?

A. There are, twice.

C. Q. 104. And does the patent tell you that the eccentric cams in the two instances you have mentioned, have such a form as that the working surfaces of such cams should be equidistant from any common center?

A. It does not; but as it does not describe them otherwise than having a common center, and as they would not both act to push up the movable jaw, together, unless they had, I think I have the right to infer that is the case.

C. Q. 105. Do you not know that the surfaces of those cams
1087 might be of a hundred different shapes, and still answer all the conditions of that machine, and not one of those shapes preventing a working surface equidistant from any common center, it only being necessary that the two cams, described in the patent as mounted upon a single shaft, should be fac-similes, or nearly so, of each other, and so shaped and made to act upon the movable jaw by the vibratory motion of the shaft, upon which they are fixed, so as to move the movable jaw far enough away from the fixed jaw to admit the rail to pass down between them, and then to move that jaw back again by the rotation of the shaft with the cams upon it in the opposite direction, so as to bring up the jaw firmly against the side of the rail, and there hold the jaw firmly, and the rail between the jaws firmly, while a patch is being welded on the rail and the shaping of the crown of the rail completed?

A. I do not understand that a hundred different shapes could be substituted, as stated in the question; and the operation is described in the patent in such a way that I can't consider any other form than an eccentric cam, as defined by me, and as I think described in the patent, meant or intended to be used, as I find it said that a half-turn of the crank will move the press-block over a space a little more than the extreme width of the rail; and I also find that another half-turn of the crank

will pinch it together. Now, a cam, not made in the form of an eccentric, as described by me, could not continuously move the jaw forward and backward by a half-turn of the crank, excepting by the assistance of some other force, if it did not bear on both sides of the cam, and if the cam had not a circular periphery. But I do not think it necessary that the cam should be brought down always to the dead point,
1088 when pinching the rail, so long as it holds it firm enough to prevent the jaw from backing out; nor do I mean to construe the patent legally at all, but simply to refer to the machine, as I understand is described in the patent and in the drawing.

C. Q. 106. Going back now a little, and leaving out from sight all question of names of cams, and of scientific terms thereof, will you be kind enough to say, merely as a practical man, whether, in your judgment, a machine constructed substantially like that described in the Cawood patent, of the full working size of that machine, could be so made as to work successfully on two different rails, the one similar to the other, the only variation being one-sixteenth of an inch in their thickness, for the purposes of welding on patches and shaping the top of the rail?

A. I think if the machine was made to fit a narrow rail, say the narrowest of a lot, all within a reasonable range of a variation in width could be practically held and mended, provided the jaws could be held tight, so that they would not back out, and therefore I think they could.

Examination adjourned to Friday, May 17th, 1872, at 8 a. m., by consent.

NEW YORK, *May 17th*—8 a. m.

Parties met pursuant to adjournment.

Cross-examination of Mr. Hicks continued:

C. Q. 107. Are you acquainted with the manner of patching rails upon the old swage-block, as practiced prior to the Cawood invention?

A. I have seen rails so mended previous to the date of this patent—somewhat familiar with it.

C. C. 108. Could you, in a Bain machine, such as is represented
1089 by the model here marked "Bain machine, H. W. B.," patch rails successfully, if the side rolls were removed?

A. I don't think I could, successfully.

C. Q. 109. Why not.

A. I think that the upper and lower rolls require something corresponding to the side rolls to keep the rail in place, and to shape the rail sidewise, if it is thrown out at all by the upper rail.

C. Q. 110. Would not the upper die keep the rail in place?

A. It would not, because it is movable, and also because there is nothing to guide the rail, as the patch, when first put on, does not necessarily fit the upper groove.

C. Q. 111. How is the upper die movable?

A. I am speaking in reference to the model, which I find to be loose, and suppose it was intended to be so.

C. Q. 112. Do you understand that, in the use of the Bain machine, the upper die is movable on the body of the roll, or that it is made fast on the body of the rail; which?

A. I never have seen a Bain machine, except as it is represented by this model, to my knowledge. I don't know whether it is or not.

C. Q. 113. You have given considerable testimony about it on your direct examination, haven't you?

A. In all my testimony in my direct examination I have referred, or intended to refer, to the model before me as representing the actual Bain machine; and my opinions have been given with that supposition on my part, drawing some information from what others have told me, and from the depositions I have read.

C. Q. 114. Well, then, if I understand you, you say that you have understood, and now understand, that in the use of the Bain machine the upper die, which shapes the top of the rail, is loose upon the body of the roll, or upon the shaft, so that it is movable in the direction of the length of the roll while doing its work?

1090 A. I should hardly expect to find it loose so that there would be considerable play between the roll and the die; but, judging from the model as a correct representation, I could form no other conclusion. I think, however, it might work better if practically tight.

C. Q. 115. Now will you be kind enough to answer C. Q. 113, with the understanding that in the Bain machine the die is fast on the roller?

A. My answer before was that I thought not successfully, and that is my answer now. I gave a reason before, because the die was movable upon the shaft. I think that when it was firm there would be other reasons which would prevent the rail from being patched successfully.

C. Q. 116. Be kind enough to name the other reasons?

A. One reason is that the upper roll, with its die, as it does not reach down with its sides upon the tread of the rail, might not keep the rail in position; it might move about. If, however, a groove was placed in the lower roll, this difficulty would be obviated. I would say, further, that the rail, if heated very hot all through, might be thrown out of shape by the pressure of the upper roll.

C. Q. 117. Do you know how the rails are heated in the use of the Bain machine?

A. I have had it described to me; otherwise I do not know; but I know that the top and patch must be heated to a welding-heat.

C. Q. 118. Who described the heating to you?

A. Mr. Harvey Waters, in his deposition, and another gentleman, I think, by the name of Ragland, in his deposition; and I think there are other depositions which refer to the subject, and Mr. Whipple has described it to me.

C. Q. 119. Do you understand, then, that when the top of the rail and the patch are at a welding-heat the neck of the rail is at a white heat?

1091 A. I don't think that any of the descriptions that I have read have particularized as clearly as that; but I understand that the endeavor is to heat that part of the rail having on the patch, which is the head, to a welding-heat, leaving the bottom and middle as cool as possible; but yet I do not see how the top could be heated to a welding-heat without carrying the upright of the rail to very nearly, if not quite, a white heat.

C. Q. 120. Do you think, then, that, with the upright of the rail, as you call it, heated as hot as it must be heated in order to bring the crown of the rail to a welding-heat, *that* it, the upright of the rail, would have sufficient strength or rigidity to sustain itself under the action of the upper die in welding on a patch and shaping the top of the rail in the Bain machine?

A. If the patch was at a good welding-heat and a shape nearly corresponding to the rail at the top, it might be sufficient to sustain the

pressure brought upon it without yielding perceptibly; but if that pressure was very great upon it, it probably would yield somewhat and become distorted.

C. Q. 121. Will you now be kind enough to say whether, if the side rolls in the Bain machine had their axis moved out of a plane in which they now are to the space of six inches, as to guide the rail to the upper and lower roll, but without supporting the rail under the action of the upper and lower roll—whether the machine, then moved, be good for anything for the purposes for which it is now used?

A. If I understand the question, the side rolls are to be in a plane parallel with their present diameters, which are at right angles to their axis, so as to guide the rail six inches distant from the plane passed through the centre of the upper and lower roll. I do not think that the side rolls, in this position, would be a perfect guide to the rail, nor would they be as useful for re-forming the sides of the rail
1092 and crown as they are now; for in drawing out the rail, the motive power, which compels the rail to move, would be taken away six inches before it reached the side re-forming rolls, and therefore the rolling would be incomplete.

C. Q. 122. Would there be any other reasons, in your judgment, than those which you have already given, why the rolling would be incomplete?

A. I don't think of other reasons at this moment, but I think it would be an impracticable arrangement.

C. Q. 123. Which do you think would produce the greatest strain upon a rail when resting upon its bottom in welding on a patch, the top roller in the Bain machine or the hammer used with the Cawood machine?

A. I can't say that in the Cawood machine the hammer produces any strain upon the rail, as I understand a strain. I think it is prevented from a strain by the jaws of the machine. If what is meant by strain is the force required to crowd down the patch brought to a welding-heat, I should say there was far less strain practically required in the rolls, for the reason that no more force is used than is necessary and required; but in the Cawood machine you are dependent as to the strain or force applied by the will of the striker, and as to his judgment or want of judgment as to the blow. If, however, it is meant to ask me whether it requires more force, actually, to do the work of forcing the patch at a welding-heat upon the top of a rail so that it shall unite, I should say that the force in both machines required would be the same exactly, taking the same time, and taking the rail at the same heat; but as in the Bain machine, as I understand it, the work would be done in a very much less time, so that the iron would have much less tendency to cool, I reply that I think the Bain machine would take less force.

1093 C. Q. 124. I suppose that you are well aware that rails can be made, and have been successfully patched, with a hammer on the old swage-block, where, in the welding on a patch, the rail sets in its natural position upon the anvil or swage-block, with no other support than what is permitted by the anvil itself, under the bottom of the rail. Is that so?

A. I have no doubt that the rail has been, and can be, mended in that way, provided we have on said anvil for use the forms which are called C C in the Cawood patent, and what might be said to be successfully as far as their completed shape is concerned; but I think that as to the

matter of time, if that is an element of success, it would be mighty slow work, and would hardly pay.

C. Q. 125. Then you think the Cawood contrivance as described in his patent is an improvement upon the old swage-block, do you not?

A. I think that the machines which were made after the Cawood patent was invented, having jaws shaped to the rail and used upon railroads, was an improvement.

C. Q. 126. What machines do you mean which were made after the Cawood patent was invented?

A. I mean all those machines used to hold the rail in jaws on an anvil; to hold the rail in position while the patch is put on, which have been used.

C. Q. 127. Well, ain't all those machines to which you refer, which are used to hold the rail in jaws or an anvil, Cawood machines?

A. That's a question I can't answer. I think that's a question for the court.

C. Q. 128. Is not the machine described in the Cawood patent to be used to hold the rail in jaws or on an anvil while a patch is being welded on?

A. I think it was decidedly so intended.

1094 C. Q. 129. Well, then, that was an improvement on the old swage-block, was it not?

A. Yes; I think if constructed for practical use it is an improvement upon a common anvil or swage-block.

C. Q. 130. Well, the improvement there consists, does it not, in adding the jaws to the anvil so as to assist in supporting the rail in welding on a patch?

A. I should say, in supporting the rail while welding on a patch in practical use, for I do not believe that we should depart from the spirit of the Cawood patent if we should cut out the bottom deep enough to receive the rail of any height which we have occasion to repair, nor if we take off part of the lower conformation of the jaws to the rail, nor if we put in it a rail which does not quite fit, for certainly the machine must have been intended to have been made practical and useful, and I consider that part of these changes or these adaptations necessary to make the exact machine described in the Cawood patent useful upon rails as they come for repair from a railroad-track.

C. Q. 131. Will you be kind enough now to answer C. Q. 130?

A. I think it does.

C. Q. 132. You have said, I believe, in substance, that this Bain machine would be good for little or nothing without the side rolls. Now, suppose, if you please, that to this Bain machine without the side rolls, the side rolls be added as represented in the model marked "Bain machine, H. W. B," so as to assist the bottom roll in supporting the rail while welding on the patch, it becomes a good practical machine, does it not, for the purpose of welding rails?

A. I do not think that, strictly speaking, it is right to say that the added side rolls assist in supporting the rail, but this much I can

1095 say, that the adding of the side rolls for the purposes for which they are used, in my opinion, is a great improvement for mending rails.

C. Q. 133. Is that all you can say? Can't you say that the adding of the side rolls to operate as represented in this model makes the machine a good, practical machine for mending rails, and that without the side rolls it was not a practical machine at all for mending rails?

A. I think I can say that; but I'm not *a* aware that the Bain machine

was ever attempted to be used without the side rolls, nor should I call it the Bain machine, without the side rolls.

C. Q. 134. You have said, I believe, that a machine like this model marked "Bain machine, H. W. B," would be a good machine for patching rails. Would it be good for anything else that you know of?

A. I think it would reshape a misshapen rail the whole length, whether it needed a patch or not, although when the rail reaches a flat place upon the upper die, it would probably leave that portion unfinished. For any other purpose, I do not think it would be used.

C. Q. 135. What do you mean by reshape?

A. Well, suppose the top of the rail was brought by force nearer the bottom than it might be, or other distortions had got into the rail, I think, if properly heated, the rail could be thrown back into shape again.

C. Q. 136. Did you ever know any such thing practiced in any of the railroad shops of this country or any other?

A. I do not, and I do not believe it is.

C. Q. 137. (De bene esse.) I see a model here marked, "Exhibit Whitehouse machine, W. C. W., notary;" does this model correctly represent the apparatus described in the Whitehouse patent, so far as relates to the jaws and their support?

1096 A. As far as I am able to discover by what examinations I have made, I think it does. If it does, I cannot say in what particulars it does not.

C. Q. 138. (De bene esse.) Could you patch railroad-rails successfully in a machine constructed like this model?

A. If you mean a modern T or H rail, you could not, without conforming the jaws to the upper portion of the tread of the rail and cutting away all under that immediately, so as to admit the rail. I think it would be desirable to make a change in the method of moving the jaws together and holding them there; but yet it is substantially the same method, in kind, as shown in model Ills. C. R. R. Co., machine, where the jaws are held together by a weight.

C. Q. 139. (De bene esse.) Do you mean to answer yes, or do you mean to answer no to C. Q. 138?

A. I have already answered that question in my direct examination. If a rail be shaped like the form shown in the model Exhibit Whitehouse machine, it could be mended, but if a modern T-rail was to be mended, the shape of the jaws must be changed, and I will further say, that I know of no rail of the shape shown in the model, neither do I know that rails as such were ever put into the machine.

C. Q. 140. (De bene esse.) Could you make a machine like model Exhibit Whitehouse machine, W. C. W., notary, into such a machine as that described in the Cawood patent, by merely altering the shape of the jaws—and, if you please, you will understand the question to refer only to the anvil and jaws, leaving out of mind whatever they are operated with—in the Whitehouse machine?

A. As I understand the Cawood patent, you could not.

WILLIAM C. HICKS.

Subscribed and sworn to before me this 17th day of May, 1872.

WM. CLITUS WITTER,
Notary Public, N. Y. Co.

1097 NEW YORK, *May* 20, 1872.

W. H. Hicks being examined on the redirect by Geo. Gifford, deposes and says:

R. D. 141. In answering C. Q. 140, you say as you "understand the Cawood patent;" what do you mean by the words Cawood patent in that answer?

A. I mean the machine described in the Cawood patent.

WILLIAM C. HICKS.

Subscribed and sworn to before me this 20th day of May, 1872.
[SEAL.] WM. CLITUS WITTER,
Notary Public, N. Y. Co.

End of first part.

WM. C. HIBBARD.

JUNE 28, 1872.

Cross-examination:

C. Q. 1. What do you consider to be the functions of the jaws in the Cawood machine, when combined with the anvil, as described in the Cawood patent?

A. It is to support the crown and sides of the rail and prevent them from being distorted from their true shape, so far as they came in contact with the rail, under the blows of the hammer; and to embrace a considerable length of the rail, or as much of the length as would usually be mended at one time, so that the smith may hammer upon any part of the length embraced by the jaws as the work may require.

1098 C. Q. 2. The primary function is to preserve the shape of the rail, is it not?

A. I think not, by itself. It is to preserve the shape of the rail while being hammered, and to act as an anvil for that purpose. The work to be done is the mending of the rail by the ordinary process of smithing, and the Cawood block is an anvil for this purpose so modified as to enable it to preserve the shape of the rail while this is being done.

C. Q. 3. How do the jaws in the Cawood machine tend to preserve the shape of the rail during the operation of welding on a patch?

A. They do it by fitting the surface of the rail over a considerable length in those parts which come opposite to places where the blows are to be struck, so that while they support the rail under the blows there is no tendency from that cause to distort the surface which rests upon the block.

C. Q. 4. What distortion of the rail would be likely to take place if the rail were mended without the use of the jaws upon a common anvil?

A. That would depend much upon what kind of a mend was to be made. If it were a patch upon the tread of the rail, it would probably tend to upset the neck of the rail and lower its height, or to diminish the space between the upper and lower flanges, or perhaps to drive one side down more than the other.

C. Q. 5. What do you consider to be the functions of the side rolls in the Bain machine as it is organized and arranged for the purpose of repairing railroad-rails as shown in Exhibit "Bain machine, H. W. B.?"

A. It is to roll the sides of the rail and to shape it if out of shape, and co-operate with the other two rolls in the well-known process of rolling.

1099 C. Q. 6. In the operation of repairing the crown of a rail in the machine, do these side rolls produce any change of form in the web or flange of the rail?

A. In my opinion they do, although the change in form which they produce is probably considerably less than that produced by the upper roll,

and more than that produced by the lower roll. The amount of displacement of iron produced by the upper sides of the side rolls must be very appreciable, if there is an excess of iron in the patch, because the strain that is exerted upon that part of the head of the rail that is over them is taken directly upon them, and is equal to that exerted by that part of the upper roller, which is directly above them; and, further, when the end of a rail has become considerably battered, the neck of the rail at that place is generally considerably battered; the neck of the rail at that place is generally considerably distorted, and the side rolls bring it back to its proper shape.

C. Q. 7. The latter part of your answer refers to what you consider to be the effect of the side rolls upon the head of the rail, does it not—I mean all after the first sentence?

A. No; it refers to the side of the web; also, if it happens to be out of shape.

C. Q. 8. Suppose that the neck and lower flange of the rail to be repaired have not been distorted from their original form, and only the upper portion or crown of the rail is injured, so as to require patching, would the side rolls perform any other function in the operation of patching such a rail than to support the head of the rail, and to preserve the form of the neck and the lower part of the head of the rail?

A. They would. They would have to reform that part of the rail mentioned, because the rolling down of a patch, which is in its cross-section in excess of the amount of iron that is required in any
1100 place, of necessity causes the iron to project downwards upon the side roll, and compels it to do a portion of the work of extending the iron to dispose of the excess in the direction lengthwise of the rail. You cannot roll a rail of iron and make one rail do all the work. It must be done by both the opposing surfaces of the rollers between which the rail is compressed.

C. Q. 9. Suppose that the side rolls were removed altogether from the machine, could a patch be fastened upon the rail by the operation of the upper and lower rolls only?

A. It could; but it would probably distort or upset the neck or web of the rail, and would not re-form the sides and lower part of the head of the rail, but would form the tread of the rail and preserve its proper height. That is, it would not re-form those parts which it is the office of the side rolls to do.

C. Q. 10. Suppose a rail, the crown of which is somewhat depressed and refoliated, be placed, after being heated to a welding-heat, in the Cawood machine, for the purpose of having a patch welded to its upper surface; is the shape of the neck and lower part of the head of the rail re-formed or affected in any way by the operation of the machine?

A. It may be, to a small extent, if the distortion of the rail in the parts to which the blocks are intended to fit is not great. It may be corrected to some extent, perhaps, by compressing the blocks together; but there is no provision in the machine to apply the power to a sufficient extent to do much toward re-forming the rail.

C. Q. 11. Could not a distortion no greater than that usually found in the head and neck of the majority of rails practically repaired be corrected by the use of the Cawood machine, in the manner described in your last answer?

A. My impression in this respect is that practically, with a
1101 large majority of the rails to be mended, the distortions in the form of the rail are mostly confined to the head, and to that part of the head principally that comes above the jaws and does not touch

them, so that the jaws of the Cawood machine really, in practice, have no re-forming to do, but simply to preserve that part of the rail with which they come in contact.

C. Q. 12. It is your impression, then, is it, that in the majority of rails practically repaired the part of the rail below the head does not need to be re-formed, but simply to be kept in place while the patch is being welded to the upper surface?

A. It is mainly so. Sometimes, however, as I understand from the testimony in this case, the neck of the rail may be driven down somewhat by use, in which case the rail, when put into the block, would hang by its head, and when hot, by hammering upon the top, the neck may again be driven down and elongated until the bottom of the rail rests upon the anvil.

C. Q. 13. In the Bain machine, the head of the rail is partly supported immediately under the point of pressure, by the side rolls, is it not?

A. It is.

C. Q. 14. And in the operation of the machine, as the rail is passed through it, the relation of the line of pressure by the upper roll to the line of support by the side rolls and lower roll is constantly maintained, is it not?

A. It is.

C. Q. 15. Suppose the upper roll were removed from the Bain machine and a rail were placed between the three remaining rolls, the upper portion of the side rolls would be in contact with the under portion head of the rail, and would present considerable surface for the support of the head of the rail, would it not?

A. I don't think it would. It would theoretically bear upon the rail only upon a line.

1102 C. Q. 16. You have said that the head of the rail is partly supported by the side rolls. Are not these side rolls, as the machine is practically used for repairing rails, in their turn supported in part by the lower roll?

A. I suppose they are, judging from the model and mode of the operation of the machine; but I have never seen the machine operate.

C. Q. 17. Do you regard the Bain machine, as shown in the model, as practically adapted for the rolling of rails from a fagot?

A. I do not. Other forms of rolling-mill I regard as better for that purpose, where so great change of form is required, and the work of which has to be distributed among several intermediate forms in converting a fagot into a rail. But where but little change of form is required, this mode of giving form to the rail will work practically well, and is particularly applicable to the mending of rails, because it permits the tread of the rail to come uppermost, which is the more convenient position in which to apply the patch to it.

C. Q. 18. As a practical machine, is it adapted to any other purpose than that of patching rails?

A. I do not know of any other purpose to which it is adapted except rerolling rails, whether patched or not, as occasion might require. All that the machine does is to roll them.

C. Q. 19. Do you consider that the machine could be advantageously used in the process of rolling rails in any of the stages of manufacture?

A. I do not, for practical reasons, not depending upon the mode of operation of the machine. I refer to railroad-rails, which can be more cheaply made by two rollers only. But for rolling light forms of double T-iron, I think this mode of rolling would be excellent for the finishing pass.

1103 C. Q. 20. Will you please to state what operation you would perform upon a piece of double T iron, such as you mention, by the use of this machine; that is, what form would the iron be in when introduced into the machine, and what changes would be effected upon it by the machine?

A. I would put it through the machine in the same way that any other bar would be passed through, and its form would be that of a double T, but of greater area of section, in which case the machine would reduce it in cross-section in all parts, simultaneously and equally.

C. Q. 21. Did you ever see a rolling-mill, in which four rolls, having their axis in the same plane, were made to operate simultaneously upon the object to be rolled?

A. I never did. I have read descriptions of such in books.

C. Q. 22. For what purposes were such rolls used, or intended to be used?

A. In one instance, that of Gilchrist, the machine was intended to roll various kinds of blanks, and which has been already referred to in my direct examination. Another, called the Union rolling-mill, I believe, had four rolls, but they were not all in the same plane, the side rolls being placed just after the horizontal rolls. I think I have seen descriptions of others, but I do not recollect others that existed before 1853.

C. Q. 23. Do you know whether the Gilchrist machine is a practically operative one?

A. I do not. All I know of it is what I learn from the description of it in the English patent of it, and my own opinion of its operation.

C. Q. 24. You have testified, in your direct examination, that the Michigan Southern machine, the bayonet-vise, and Beebe & Smith block, do not contain substantially such a movable press-block or jaw as is described in the Cawood patent, and that they do not contain
1104 substantially such means of combining and operating the press-blocks or jaws as are described in the Cawood patent; you have also, in answer to int. 21, given three different constructions, which you say might be given to the Cawood patent; upon which of these constructions was your testimony above referred to based?

A. It was the first and third; but the three categories mentioned were stated after the answer mentioned in the first of the interrogatories cited in this question, and the conditions of that question did not require either of the three categories mentioned, in order to answer it, as the question referred to the movable press-block, without mentioning other parts of the machine.

(Signed) WM. C. HIBBARD.

1105 Testimony taken before Henry W. Bishop, master in chancery of said court, Wednesday, June 12th, 1872.

Present: The complainant in person; John N. Jewett, esq., of counsel for the defendants.

L. H. CLARKE, a witness produced on behalf of the defendants, being first duly sworn, does depose and say as follows:

Interrogatory 1. Please state your name, age, residence, and occupation.

Answer. L. H. Clarke; age, 42; residence, Chicago; occupation, civil engineer.

Int. 2. Have you been in the business of railroading; if so, how long, where, and in connection with what roads and in what capacity?

A. Yes; I have been connected with railroads about 22 or 23 years, in New England and Illinois, in connection with the Vermont and Massachusetts, the Vermont Valley, the New York and New Haven, the Illinois Central, also the Racine and Mississippi in Wisconsin. I have been chief-engineer of the Illinois Central, for, I think it is, 12 years, and am still in that capacity.

Int. 3. Have you had under charge in your department, as engineer on the Illinois Central Railroad, the track and track repairs for that company? If so, for how long?

A. I have, and during the whole time that I have been chief-engineer of that road.

Int. 4. Has your department had under charge also the repair of rails during that time?

A. It has.

Int. 5. Have you, as chief-engineer, been familiar with the dif-
1106 ferent modes of repairing rails, had occasion to investigate the subject of rail-mending, and opportunity to know the expense of it?

A. I have, as rails have been repaired on the Illinois Central and in this vicinity.

Int. 6. What are the modes of repairing rails practised at different times on the Illinois Central Road, and other roads of which you are familiar?

A. By hand and Bain's machine.

Int. 7. Have there or not been different methods of mending by hand employed? If so, what are they?

A. Yes, by the use of swage-blocks, and have been repaired without any swage-blocks on an anvil.

Int. 8. What machines or contrivances do you denominate swage-blocks?

A. It is a machine having two jaws, made to fit the contour of the rail, one or both of which are movable.

Int. 9. How long and to what extent were such machines in use on the Illinois Central Railroad?

A. I think they were in use when I was appointed chief-engineer, to some extent, and were used for repairing rails quite extensively up to 1869.

Int. 10. What took the place of those machines in 1869?

A. In the spring or summer of that year we put into use two sets of Bain's rolls.

Int. 11. Was or not the mending of rails by hand substantially abandoned on that road at that time?

A. It was.

Int. 12. What was the average expense of the mending of rails to the Illinois Central Railroad Company, per foot or inch, prior to that time?

A. I think about five cents per inch. That is the best of my present recollection.

Int. 13. Does or not that estimate include handling or transportation to or from the shops?

A. It does not.

1107 Int. 14. What kind of rails have been most generally mended upon the Illinois Central Road?

A. The common T-iron rails.

Int. 15. To what extent have the rails on the Illinois Central Road generally been mended prior to 1869?

A. The average has probably been, say, 14 to 18 inches per rail.

Int. 16. On one end or divided between two ends?

A. Between the two.

Int. 17. What is the effect as to smoothness and density or hardness of the parts of the rail of the process of patching or mending the rail as practised on the Illinois Central Railroad prior to 1869?

A. As to smoothness generally a slight difference may be discovered between the patched portion and the portion not patched, depending much on the skill of the workman. The portion of the rail mended being hammered, the density is probably increased slightly.

Int. 18. What effect would the heating have upon that portion of the rail contiguous to the patching?

A. It would tend to open the iron somewhat. I mean that iron brought to a high heat and not worked is softer than the parts that are worked.

Int. 19. What effect would this have upon the wearing of the rail when used for heavy transportation?

A. It would impair its wearing qualities, in my opinion, to some extent.

Int. 20. What effect would this contiguity of the hardened and softened iron produce in respect to the smoothness or evenness of the track?

A. Till the rail became worn it wouldn't produce any.

1108 Int. 21. What effect would it produce upon the wearing of the iron?

A. There would be a point back of the patch more likely to give out than the other parts of the rail.

Int. 22. Has or not your experience and observation of rail-mending in that manner verified the statement last made?

A. It has.

Int. 23. Is there or not any difference in this respect between the mending of rails by hand and mending them with the Bain rolls? If so, explain the difference and the cause of it.

A. In the Bain rolls it is intended to run the iron through the rolls nearly to the cold part, subjecting the portion of the rail that is heated to the pressure of the rolls, while in hand-patching the rail is heated only to the end of the patch.

Int. 24. Does or not this continuous rolling of the heated portion of the bar equalize, or tend to equalize, the density of the entire heated portion of the rail?

A. That is its tendency and object.

Int. 25. To what extent and from what causes do rails ordinarily become exfoliated or broken down, the rail being generally of good quality?

A. They generally give out first at the ends. The giving out of a good rail is generally progressive, and if they are not removed from the track, and that slight depression restored, will continue till it may reach a foot or more from the ends before they become so badly battered as to be unsafe for trains to pass over. The cause is simply the continuity of the rail being broken. Every wheel that passes over inflicts a blow upon the end of the rail, consequent upon the existence of the joint.

Int. 26. What portion of the rail is most liable to be defective, growing out of the manner of its manufacture?

1109 A. The ends. In manufacturing rails, as it leaves the rolls it is generally from 2½ to 4 feet longer than the finished rail it is intended to be. This extra length is cut off equally from both ends, intending to get to the point where the rail is solid; the process of manufacturing being such that the ends of the rail as it comes from the

roll being more likely to be deficient than other portions from imperfect welding.

Int. 27. Is there or not greater tendency of the rail to give out first at the ends, in consequence of this?

A. Not necessarily. If the rail is made with care and a sufficient length to cut off from the ends of the rail as it leaves the rolls, the ends of the finished rail should be as thoroughly welded as the other portions.

Int. 28. How is this as a matter of fact in the making of rails?

A. I should say that there are more rails defective at the ends than elsewhere, as a matter of fact. I desire to be understood as stating that there is no reason why they are necessarily defective at the ends, if properly made.

Int. 29. When a rail has given out a few inches at the ends, might it not readily be cut off without being taken to the shop, so as to remove entirely the unsound portion?

(Objected to by Mr. Turrill.)

A. It might.

Int. 30. What would be the expense of thus removing the damaged parts of the rail?

(Objected to.)

A. Probably about ten cents an end.

Int. 31. Would it or not be practicable, in your opinion, by using
1110 the rails of different lengths to repair damaged bars, in that way, and has it not been done to your knowledge?

(Objected to.)

A. Yes, to the whole question.

Int. 32. Please state your opinion, formed from your observation and experience, as to the desirableness or economy to railroad companies of patching railroad rails.

(Objected to.)

A. In my opinion, it depends much on the character of the rails laid in the road, the extent of business done, and while it would be economy on some lines, on others it would not. A road doing a moderate business only, with a good quality of rail, would be likely to find it economy to repair. On roads doing a large business, I consider the question an open one. If their rails are originally of good quality, there might be economy in mending. But unless their rails are of very good quality, I think there would be no economy in repairs. I consider it a question that can only be decided by each road, according to their several circumstances. I mean to say this, that in repairing rails it is not unusual to find, after the repaired rail has been replaced in the track, defective places other than where the rail has been repaired, and the rail will give out at those places while the repaired portion remains entirely good. Rails of this character do not pay to mend, and, in my experience of the last few years, I have found this to be the fact in a large number of rails that have been repaired under my direction.

Int. 33. Counting in as nearly as you can all the items which would go to make up the expense of repairing rails upon the swage-block by hand, and the items of expense and loss incident to the cutting
1111 off of rails without taking them to the shop, will you state what would be the advantages and disadvantages of the two methods of remedying defects in rails, in respect to cost?

(Objected to.)

A. I should say the expense of repairing would be about 50 per cent. greater than that of the cutting.

Int. 34. Taking the Illinois Central Railroad and its business as a fair exponent of railroads and railroad track, what is your opinion of the desirableness or economy of mending rails upon the swage-block as practiced on that road prior to 1869?

(Objected to.)

A. The traffic on the Illinois Central Railroad varies in amount materially on different portions of the road. On the heavier worked portions I should not recommend repairing rails, while on the portions of the road where the traffic is lighter, it would probably pay.

Int. 35. What proportion of the road would fall within the latter class?

A. About one-third.

Int. 36. In estimating the desirableness of rail-mending, have you taken into account the payment of any royalty for the use of machinery with which to mend rails?

(Objected to.)

A. I have not.

Int. 37. If to the actual expense of rail-mending by hand was to be added an expense for the use of the swage-block, what would be your judgment of the desirableness or economy of rail-mending in that way?

(Objected to.)

A. If any large amount was added as royalty to the cost of mending, I think it would be prohibitory.

1112 Int. 38. What would be your judgment of a large amount under such circumstances?

(Objected to.)

A. I should consider a cent an inch a large amount.

Int. 39. What amount of royalty under circumstances where you have said it might be desirable to mend rails would make it undesirable to repair at all?

(Objected to.)

A. Half a cent an inch.

Int. 40. How would you, under such circumstances, dispose of rails rendered unfit for use by wear in the track, taking the Illinois Central Railroad as an illustration?

(Objected to.)

A. Where the traffic is not heavy, I should reroll the rails. I should, in the heavier worked portions of the road, substitute steel rails for iron as rapidly as practicable, in consideration of the earnings, and sell the old rails.

Int. 41. In the absence of steel rails, what disposition would you make of old rails on roads of light and heavy traffic, both?

(Objected to.)

A. I should reroll them.

Int. 42. Are you to some extent familiar with the roads and traffic of the Chicago & Alton, the Chicago, Burlington & Quincy, the Pittsburg, Fort Wayne & Chicago, and the Lake Shore & Michigan Southern Railroad Companies? If so, for how long?

A. I have some general knowledge of the character of the roads and their business, and have had for the last ten years.

1113 Int. 43. From your knowledge and observation, to which class of roads as you have divided them, according to traffic and business, would they belong, during the time of your acquaintance with them?

A. Roads of heavy traffic and business.

Int. 44. As a choice between two methods of rail-mending, which do

you prefer, the old process by hand with swage-blocks, or the Bain rolls?

A. Bain's rolls.

Int. 45. Please state the reasons briefly.

Ans. In capacity, and general better finished work.

Int. 46. How do the processes compare in cheapness, and what is the difference?

A. Bain's process costs about one-half hand-work.

Int. 47. What royalty is paid by the Illinois Central Railroad Company for the use of the Bain machines?

(Objected to.)

A. Fifteen cents a rail until a certain gross amount is reached, which amount I do not now recollect. After it is reached, the royalty terminates. A certain amount was paid down, which I do not now recollect.

Int. 48. What has been the average amount of mending per rail done on the Bain machine as used on the Illinois Central Railroad?

A. About forty inches.

Cross-examination by Mr. Turrill:

Cross Int. 1. Did you ever have any rails repaired on what is called the common anvil?

A. Not to any extent.

C. Int. 2. Where did you see rails repaired on the common anvil?

A. I think we repaired a few at Champaign; I think I saw some repaired at the Northwestern shops in Chicago some years ago.

1114 C. Int. 3. Does it or not require a skilled blacksmith to repair rails on the common anvil properly?

A. It does.

C. Int. 4. Does it require a skilled blacksmith, or is it necessary to have them to repair rails as is usually done in what is termed the swage-block or machine for supporting the sides of the rails?

A. It requires a man who understands working iron properly under a welding heat, and who has experience in this kind of work.

C. Int. 5. Could you have repaired your rails and made a practical business of it on what is known as the common anvil?

A. I am unable to say.

C. Int. 6. What do think it would have cost you per foot to repair your rails on a common anvil?

A. Probably from seventy cents to seventy-five. I am unable to state with certainty.

C. Int. 7. How many feet did your men repair per day, while repairing at Champaign?

A. I do not recollect.

C. Int. 8. How many men did you have to a fire, and the wages of the men while repairing on the common anvil?

A. We always worked three men at a fire in all repairing rails. I do not recollect the wages we paid at any particular time.

C. Int. 9. Did you work but two men at a fire in repairing rails on the swage-block?

A. We worked two men and a smith, making three men in all cases.

C. Int. 10. Were not your men, in patching rails, in the habit of swaging the top of the rail beyond the part patched, and at the time the patch was put on, and then again after the patch had become partially cool while running the top swage over the rail to finish it up?

A. Yes.

1115 C. Int. 11. Wouldn't that top swaging condense the iron as far as heated and make it equally as good as the part not heated?

A. It wouldn't get as much work while at a welding heat as on the patch, and probably not get as thoroughly condensed as the part patched.

C. Int. 12. Are not the upper and lower rolls in the Bain machine adjusted to special patterns of rails in height when cold?

A. They are, if I understand the question.

C. Int. 13. How much pressure would there be then on the rail beyond where the patch is applied, and to the distance the rail is heated beyond the patch if the rolls just fitted it in height when cold?

A. Bain's process consists of two operations: the first is in passing the rail between a set of rolls in an upright position, in which process the patch is welded on to the rail. It is then turned down on its side and passed through another set of rolls, which form the rail to the proper templet. These side rolls are so adjusted as to slightly expand the rail back of the patch in the direction of its height, and by a set of friction rolls operating in connection with the side rolls to bring a heavy pressure on the top and bottom of the rails.

C. Int. 13. How can you expand or raise the height of the rail back of the patch, and not do it in that portion patched?

A. The portion that is patched, as it passes through the rolls is necessarily subjected to the same pressure as the part behind the patch, but in the portion patched, where the excess of iron in the rail is drawn lengthwise, or in the direction of its length, which leaves the rail uniform section from its end as far as the rolls pass.

C. Int. 14. If you take a special pattern of the rail when cold, and the rolls are adjusted so as to just fit that rail as to its height,
1116 putting a rail into the furnace and heating it and putting it through in its upright position without any patch on, how much pressure would that rail receive on top?

A. If the rolls were set to just the height of the cold rail the pressure on the heated portion would be due to the expansion of the rail by the heat, whatever that might be.

C. Int. 15. Would the pressure be as much or more than is required in patching rails on the swage-block that the rails receive from the blows of the hammer back of the patch?

A. I should not think it would be any more, as I understand this to refer to the rolls through which the rail passes in its upright position.

C. Int. 16. In passing the rail through the side rolls after having passed through the other rolls in an upright position, is the rail reduced any in height or between the base and top of the head or ball of the rail?

A. It is not.

C. Int. 17. Then, if I understand you, the rail back of the patch receives no more pressure to lessen its height than what it receives in passing through the first set of rolls; am I correct?

A. The section of the rail is slightly reduced in width by the side rolls by which a pressure is brought in the direction of its height.

C. Int. 18. If you remove the side rolls in the Bain machine that support the sides of the rail, what kind of a machine would you have left for repairing rails? Would it be a practicable or impracticable machine?

A. I understand this to refer to what are termed the friction rollers in connection with the first pass of the rail through the rolls. If these were removed, it is my opionion the machine wouldn't do good work.

1117 C. Int. 19. Don't you know it would not, from your experience in the business of mending rails?

A. Yes; I think so.

C. Int. 20. You have testified as to cutting off rails, or, rather, given your opinions as to that. Does the Illinois Central Railroad make a practice of cutting off their rails when they become damaged in the track, instead of repairing?

A. They do not.

C. Int. 21. What are the lengths and the different kinds of pattern rails used by the Illinois Central Railroad Company?

A. For all new rails, 28 feet is the standard length, with a not exceeding 10 per cent. of shorter lengths, and none less than 20 feet; the intermediate lengths being 20, 22, 24, and 26 in this ten per cent. We have in our road some rails 15 feet, 18 feet, 20, 21 feet. Patterns for new rails is $4\frac{1}{8}$ inches in height, 4 inches base, weighing 61 pounds per yard; have in the road-rails 4 inches high and 4 inches base, weighing 60 pounds; also, $3\frac{1}{2}$ inches high, 4 inches base, weighing 64 pounds; also, have $3\frac{1}{2}$ inches height, $3\frac{1}{4}$ inches base, weighing 56 pounds. The rails of $4\frac{1}{8}$ and 4 inches in height are used with fish-plates. The others are the common chair.

C. Int. 22. What is the length of the road now owned and operated by the Illinois Central Railroad Company?

A. Eleven hundred and nine miles.

C. Int. 23. What proportion of the 1,109 miles is laid with fish-plate iron?

A. In the neighborhood of six hundred miles.

C. Int. 24. Is or not the majority, in fact all, railroad-rails made at the present time what is called the fish-plate iron?

A. Yes; it is a very large majority.

1118 C. Int. 25. Do you know to what extent the proportion of the fish-joint rail is used on the different railroads that you had testified to being acquainted with in answer to your direct interrogatory No. 42?

A. I cannot state the exact proportion, but a large portion.

C. Int. 26. Are what is known as the fish-joint rails as liable to give out at the ends as the old-fashioned T-rail, now used with a chair holding it in the track?

A. It is not, the quality of the iron being equal.

C. Int. 27. Does or not a large proportion of fish plate iron give out between the two ends?

A. A good deal of it does.

C. Int. 28. Do not you repair, at the present time, a good deal of fish-plate iron, what is termed center-patches, when the ends don't need repairing at all?

A. Not a large portion, but some.

C. Int. 29. Supposing you had a rail that was damaged at one end 18 inches, the other end 12 inches, the balance of the rail being perfectly good, what length would you cut off from that rail if you were cutting it cold upon the track, say a rail 28 feet long, or any other even feet?

A. I should cut off enough to remove the defective portions, and as much more as might be necessary to make it fit the ties as they might be spaced in the track.

C. Int. 30. If a rail of any length that you have stated your rails are should be damaged at one end a foot, and the balance of the rail perfectly good, about how much would you have to cut off from that rail so it could be used, as your ties are spaced, as a general thing?

A. Two feet.

1119 C. Int. 31. When a rail has become damaged, and you practice

cutting off rails cold upon the track, where would you use the rails so cut off?

A. In the locality where they were cut.

C. Int. 32. Supposing it was a fish-rail that required cutting off two feet at one end, where and how would you use that rail again in the track?

A. I should use it in the locality where it was cut, with a common chair.

C. Int. 33. Supposing rails, that have become damaged in the track, need repairing or replacing with others—not being a continuous line—if you take those rails, and cut them off cold, could you use them in the track where taken out without removing all the other rails between the places where the damaged ones were removed, if such damaged rails had one to five rails intervening between the two?

A. Of course the rails, after being cut, wouldn't fill the original space. It would require something to close the space.

C. Int. 34. Supposing you take a length of 15 28-foot rails in a track—five of them, in different places, need repairing from one to two feet on an end, and you cut off the damaged part, and as much of the sound part as to make it even feet—wouldn't you have to remove the balance of the rails that didn't need repairing, and lay them in one continuous line, to arrive at the deficiency that would be required to supply the parts cut off?

A. Yes.

C. Int. 35. Isn't that an expense of necessity, in addition to the even cutting off of the rail, if you were to practice the method of cutting rails off on the track?

A. It is.

C. Int. 36. Is it, or not, the practice of railroads, in general, to have the rails of even number of feet in length?

A. The practice varies in that respect. Some roads go even feet, and some even yards.

1120 C. Int. 37. If you were to practice cutting off rails cold upon your road, and if the rail should be damaged only a foot at one end, would you be obliged to cut off two feet, as your rails were made and laid on the line of your road, in order to use it again, after being cut off, without moving the ties?

A. We would, generally.

C. Int. 38. Then, in that case, you would lose a foot in length of a good rail?

A. We would.

C. Int. 39. What is that rail worth per foot?

A. About 75 cents, weighing 60 pounds to the yard, at the present price of new rails.

C. Int. 40. After a rail has been laid in the track, and become fractured at different points, and the rail is taken out and repaired properly on a swage-block, the balance of the rail being good--what is the value of that rail, as compared with a new rail laid in the track, as a general thing, as to service?

A. That is very difficult to estimate. I have seen some repaired rails last as well as some new rails, and others to give out in a short time that were apparently good when laid.

C. Int. 41. Haven't you seen new rails give out in a short time after being laid that looked apparently good?

A. I have.

C. Int. 42. Do the yearly reports of the Illinois Central Railroad Com-

pany show correctly the number of rails and feet and inches repaired on the same, since you have had charge of the business of repairing rails, and also the number of frogs made up to 1872?

A. The number of rails repaired is stated; the feet and inches repaired, I think, is not. I think they do not state the number of frogs made.

1121 C. Int. 43. Do you have in your account which is kept by you of the rail-repairing the correct account of feet and inches and also of rails which have been repaired during the time you have had charge of it the last 12 years?

A. I believe I have.

C. Int. 144. Did you when you were repairing on a swage-block have the foreman at the different shops on the line of the road keep the accounts of the number of rails and feet and inches so repaired, and have the same returned to your office monthly?

A. I did.

C. Int. 45. Have you those monthly reports now?

A. I cannot say positively without making an examination in my office. I cannot say without examination whether they were burned last fall or not.

C. Int. 46. Will you make an examination and report to Mr. Bishop?

A. I will.

C. Int. 47. Do you keep account of the number of rails repaired and feet or inches put thereon by the Bain process?

A. I do. I will say that I have the accounts up to the first of January, '72. We have done very little repairing since.

Redirect:

Int. 49. When were fish-plate rails first introduced on the Illinois Central Railroad?

A. I can't tell the exact date without reference. My recollection is about 1860 or 1861.

Int. 50. Prior to that time what was the rail in use?

A. The ordinary T-rail.

Int. 51. Has the substitution of the fish-plate rail for the ordinary T-rail to the extent you have mentioned been gradual?

A. It has.

1122 Int. 52. How much has been so substituted within the last three years?

A. In the last three years we have laid about 230 miles, but a considerable portion of that has been to replace other fish-plate rail. I can only give the exact amounts by referring to documents in my office.

Int. 53. Has the change been more or less extensive within the past few years than when you first commenced the change?

A. It has been more extensive the last few years.

Int. 54. For what reason?

A. From the necessity of greater renewals in the track on account of old iron worn out. The substitution has been as we had to renew the road.

(Signed) L. H. CLARKE.

Subscribed and sworn to before me this twelfth day of June, A. D. 1872.

(Signed) H. W. BISHOP,
Master in Chancery of the Circuit Court of the United States for the Northern District of Illinois.

In the circuit court of the United States for the northern district of Illinois.

SAMUEL H. TURRILL
vs.
THE CHICAGO, BURLINGTON AND QUINCY RAILROAD COMPANY. } In chancery.

Testimony taken before Henry W. Bishop, master in chancery of said court, Friday, June 14th, 1872.

Present, the complainant in person; Jno. N. Jewett, esq., solicitor, and of counsel for the defendants.

1123 MAX HJORTSBERG, a witness produced on behalf of the defendants, being first duly sworn, was examined in chief by Mr. Jewett, as follows:

Int. 1. Please state your name, age, residence, and occupation.

A. Max Hjortsberg; age, 54 years; residence, Chicago; occupation, chief engineer Chicago, Burlington and Quincy Railroad.

Int. 2. How long have you been connected with railroading as engineer or otherwise?

A. Since 1845.

Int. 3. Have you during that time become familiar with the different methods of treating damaged or exfoliated railroad-rails?

A. I have, to some extent.

Int. 4. Has the Chicago, Burlington and Quincy Railroad Company, during your connection with it, at any time mended rails by patching?

A. They have.

Int. 5. What machinery, if any, have said company used for that purpose?

A. They have used what is known as the swage-block, or an anvil and hammer; the plain anvil with grooves in it, and also the jaws for holding the rail.

Int. 6. Is said company now mending rails in the manner you have indicated; and, if so, to what extent?

A. Only a very little; as to what extent, I am unable to say.

Int. 7. Has it at any time mended rails more extensively than now?

A. Yes.

Int. 8. When was the change made in the extent to which this company has mended rails?

A. This change has been gradual. We are rerolling more and more, instead of repairing.

Int. 9. Please state the reason of the change.

A. We find it more economical to have them rerolled than to repair.

1124 Int. 10. Does said company practice to any extent the cutting of rails to remove damaged portions?

(Objected to.)

A. They do.

Int. 11. Under what circumstances have you, from experience and observation, determined the question of whether a rail should be patched or cut in order to remedy a defect?

(Objected to.)

A. If there is only a very little damage done, it may pay to patch it a little instead of cutting it off to obtain the additional length, but as a general thing we find it cheaper and better to cut off the damaged part

Int. 12. How many different lengths of rail does the Chicago, Burlington and Quincy have in its track?

A. Our regular length is uniform throughout, but we have old rail that have been lying a long time of different lengths. Our regular length is 27 feet, and some 30. We get some down to six feet by cutting. They are in all lengths, cut off.

Int. 13. How is the process of cutting managed on said road?

(Objected to.)

A. By heating the rail and sawing it off. The same mode in which they are cut in the rolling-mill, when rolled.

Int. 14. In the use of the fish-plate, do you find any difficulty in restoring the holes in the rail thus cut?

(Objected to.)

A. Not any; the rails, before leaving the shop where they are cut off, are punched as other rail.

Int. 15. What *object* does the mending of a rail by patching
1125 have upon the evenness or smoothness of the track in which such mended rails are placed?

A. If well done, it ought to be as smooth, unless the iron in the old part of the rail is softer, in which case it is apt to wear more rapidly there.

Int. 16. At what point of a rail thus mended is it most likely to give way?

A. More likely just behind the patch, I should think.

Int. 17. For what reason?

A. If there is any unevenness, it acts more or less as a blow on the iron. Being worked more in the patch, it is likely to withstand better than the old rail.

Int. 18. What is the effect of the heating of the rail for the purpose of patching it upon that portion of the iron not hammered in the process of patching.

A. It would soften it, I should think.

Int. 19. Then is it not true that in a rail so mended the density of the mended portion is increased, whilst the density of that portion contiguous to the patch is diminished?

A. It is increased in the part more hammered. I should think the density would be increased in the hammered part more than in the other.

Int. 20. How would this difference of density or hardness in the two parts of the rail contiguous to each other affect the wearing of the rail in the track?

A. It would wear unevenly.

Int. 21. Would or not in a track subjected to heavy service through unevenness of wear in time become very perceptible.

A. I think so.

Int. 22. How would this affect the car and machinery in use upon the road, if at all, and the expenses of operating?

A. It would increase the wear and tear of them, and increase the expense.

1126 Int. 23. Have you or not observed this unevenness of wear in rails that have been mended?

A. I have.

Int. 24. Is or not the traffic upon the Chicago, Burlington and Quincy Road heavy; and how does it compare in that respect with the Chicago and Alton, Pittsburgh & Fort Wayne and Chicago, Michigan Southern, and Northern Indiana and Illinois Central Railroads?

(Objected to.)

A. I should think it as heavy as any of the roads named. It is a road of heavy traffic.

Int. 25. Would you not, in determining the desirableness of mending rails, make any distinction; and, if so, what, between roads of heavy and light traffic?

A. I think I would make a distinction; I don't think I would repair rails for heavy traffic; it might be desirable to do so for roads of lighter.

Int. 26. Have you at any time calculated the expense of rail-mending with a view to determining the question of its desirableness and economy; and, if so, with what result?

(Objected to.)

A. Yes, in a general way, and the result has been that we have mended less and less for economical reasons?

Int. 27. If to the actual cost of mending rails by the process heretofore employed upon the Chicago, Burlington and Quincy Road were to be added a royalty for the use of the swage-block on which the mending is done, what would be your judgment of the desirableness of mending at all by that process?

(Objected to.)

A. I would not do it.

1127 Int. 28. How would you then dispose of the damaged rails?

(Objected to.)

A. I would cut out the damaged part.

Cross-examination by Mr. Turrill:

C. Int. 1. When did the Chicago, Burlington and Quincy Railroad first commence to repair rails?

A. That is more than I can tell you.

C. Int. 2. In what department is the account kept of the repairing of rails?

A. Kept in the track department.

C. Int. 3. Who has charge of those books and accounts?

A. The road-master.

C. Int. 4. Do you know whether he does or has, for a term of years, kept the account of the rails repaired on your road?

A. He has kept, from time to time, an accurate account.

C. Int. 5. Isn't he required to keep it all the time?

A. No, sir; he has not kept it separate from other work done in the same shop.

C. Int. 6. Who is the road-master of your road who has charge of these books at the different places where you repair rails, and for how long has he had charge of those books?

A. On the eastern division. His name is E. W. Hoyt. In the western and middle division the repairs have been done at Galesburg, and the road-masters' names there are J. D. Besler and J. T. Clark. They have been on the road for a number of years—five or six years. Both Mr. Clark and Mr. Besler have grown up on the road, and have been there longer than I have.

C. Int. 7. How long have you been on the road?

A. Since 1860.

1128 C. Int. 8. Did you ever repair railroad-rails yourself?

A. No, sir; I have not.

C. Int. 9. About how often, in the last eleven years or more, have you been in the shop where they repair rails and seen them repaired?

A. I have been there frequently.

C. Int. 10. Please describe the machine they use for repairing rails, to the best of your knowledge.

A. The machine I have reference to is, as I said, a block shaped to the rail, and a hammer or a die, whatever you may call it, which fits the other side.

C. Int. 11. How shaped to the rail?

A. I don't know how I can answer it any differently.

C. Int. 12. Is that all you know about the block used 'or repairing rails, or did they have more than one kind which you have described?

A. I don't know. I have lately paid very little attention to that department. We have done very little.

C. Int. 13. What is the length of the rails in the regular track on your road?

A. 27 feet.

C. Int. 14. When a 27-foot rail has become damaged a foot or less at one end, how much do you cut off that rail, and where do you use it after it is cut?

A. We cut off such portion as is damaged, and use it either in the main track or in side-tracks.

C. Int. 15. What kind of rail is used in the main track?

A. The fish-rail.

C. Int. 16. If you take out of the main track a 27-foot rail that is damaged to the extent of one or two feet, how do you use that rail after the damaged portion is cut off in the main track again, all the rails being 27 feet long?

A. They are not all that length. We have old portions of the
1129 track where they are of different lengths, and we have rails cut off at different lengths, and take such portions as will fit for closing up.

C. Int. 17. Are the old portions of the track fish-rail?

A. No, sir; not all.

C. Int. 18. Is there any difference in the height between the fish-rail and the old rail, as you term it?

A. There is.

C. Int. 19. Do you use the fish-rails after they are cut off in the old track where the other iron is used? If so, how, there being a difference in the height?

A. We use what we call a step-chair, that is made so as to fit the different heights.

C. Int. 20. Then do you go to the expense of punching the rails for the fish-plates, after they have been cut, if you use them with rails that are not fish-plated?

A. We do it so as to fit either place.

C. Int. 21. Do you cut your rails at any and all lengths according to the amount of damage there is upon them?

A. Yes, sir.

C. Int. 22. Take a 27-foot rail damaged a foot or less at each end, and damaged a foot or 15 inches in the center, the balance of the rail being apparently as good as new, what would you do with such a rail?

A. Cut off each end, and cut out a piece in the center.

C. Int. 23. Where, in that portion of the track, would you use those pieces which are left?

A. We use them in side-tracks, or in such places where small pieces are welded to close up a gap.

C. Int. 24. When did you first commence cutting off rails with a saw, as you have testified?

track, supposing the rails to be of equal quality at the time when made?

A. I don't know as it would be a parallel case; the very fact of the fault being there wouldn't make them equal so as to compare them.

C. Int. 50. Supposing you take a rail, put it in the track, in a very short time, a month or so, portions of that rail give out. You take that part of the rail which remains sound, after the fractured portions have been cut off, instead of repaired, placing the sound portion back in the track by the side of the new rail, both being of the same quality of iron, and made at the same time, what, in your opinion, would be the
1134 difference in the wear of those two rails?

A. If laid at the same time, I shouldn't think there would be much difference.

C. Int. 51. Then if you had taken the rail, and repaired it properly, it would wear just as long, wouldn't it, as the new rail?

A. No, I don't think it would, for the reason I stated before; they wouldn't be of equal density.

C. Int. 52. Why wouldn't they be of equal density if it had been repaired properly?

A. Because in the hammering on the patch, it would be more condensed in that place than in others.

C. Int. 53. Then the part patched wears longer than the other part, does it?

A. It sometimes does.

C. Int. 54. I believe you have testified on your direct examination that the Chicago and Alton; Pittsburgh, Fort Wayne & Chicago; the Michigan Southern and Northern Indiana, and the Illinois Central Railroads as being roads of heavy traffic. You have also testified that if you were going to repair iron you would make a distinction between a road of heavy traffic and one of light in repairing rails. Do you or not know that these roads which you have named are repairing a great deal more iron at the present time and for the past ten or twelve years than any number of roads of light traffic for the same number of miles?

A. I do not.

C. Int. 55. Do you consider the Michigan Southern and Northern Indiana Railroad, now known as the Lake Shore and Michigan Southern Railroad, as doing as heavy traffic as the other roads that you have named?

A. I should think so. I have no positive knowledge.

C. Int. 56. Do you know to what extent they have been repairing iron on their road for the last ten or twelve years?

A. I do not.

1135 C. Int. 57. I suppose then it is only a matter of your opinion as to what roads, whether heavy or light traffic, would pay, as the facts shown by the Michigan Southern and Northern Indiana Railroad, have repaired in the last twelve years, commencing 1859, and running from 49,000 rails a year up to 80,000. Do you suppose they would have repaired that amount if it don't pay them to do so, and keep on increasing the amount yearly?

A. Yes, sir; it is my opinion. I presume they wouldn't repair rails if it didn't pay.

C. Int. 58. You were asked on your direct examination, interrogatory 26, "Have you at any time calculated the expense of rail-mending with a view to determine the question of its desirableness and economy, and if so, with what result?"—A. "Yes; in a general way, and the result has been that we have mended less and less, for economical reasons." How did you make these calculations as to the expense, in a general way?

A. We have taken the actual cost, and adding the cost of labor to it, and then the actual cost of the repairing, and then of transportation and every expense connected with it, and comparing that with the expense of rerolling and its incidental expenses.

C. Int. 59. What was the actual cost to your road in repairing rails per foot, and the amount in length per rail which you did repair then?

A. I do not remember exactly what the cost was. I think at the different shops it varied from ninety odd cents up to a dollar ten, or twelve. The average length I should say from a foot to eighteen inches.

C. Int. 60. Did any of the shops where the repairing was done, have orders to repair for less on the rails than other shops on the line of the road?

A. No, sir; the repairing was done at either of two places, at Galesburg or Aurora.

1136 C. Int. 61. Did they repair as much on the rails at one place as at the other?

A. Yes, sir; they repaired what was needed.

C. Int. 62. At which place, Aurora or Galesburg, has the largest amount of rail repairing been carried on?

A. That I can't tell.

C. Int. 63. At what time did you make this estimate in which you say that it cost from ninety odd up to a dollar ten or twelve per foot to repair rails?

A. I think a couple of years ago.

C. Int. 64. Doesn't it depend on the cost of material and labor used in repairing rails as to the cost of repairing them per foot—when the labor and material is high, it costs a good deal more than it does when it is low?

A. It would cost in proportion to the value of material and labor, I suppose.

C. Int. 65. Isn't it the same in regard to the cost of getting rails rerolled?

A. Not in the same proportion.

C. Int. 66. How many rails does it take for a ton, that you use, 27 feet long?

A. Four or five.

C. Int. 67. What does the iron weigh per yard?

A. Sixty pounds per yard.

C. Int. 68. What did it cost you two years ago to get your rails rerolled?

A. I don't remember now, sir.

C. Int. 69. What does it cost you now?

A. I think that it is now thirty or thirty-two dollars; I don't know exactly.

C. Int. 70. How much would that be per rail?

A. That is a matter of figures.

C. Int. 71. About what did it cost during the war to get iron rerolled in '63, 4, and 5?

A. I do not now remember, sir.

1137 C. Int. 72. What wages do you pay the men that repair rails, and how many do you have at each fire or machine; what is the cost of fuel per fire per day?

A. I don't know; the figures I have given you were returned to me by actual charges against them at the shops.

C. Int. 73. Do you know of your own knowledge that those were the actual charges against them?

A. The men at the shops were requested to keep an account, and after a certain time to return their charges.

C. Int. 74. Do you know that they did keep an accurate account, and did you ever examine those accounts kept by them?

A. I have no reason to think otherwise than that they were correct; all the items were given; I made no other examination.

C. Int. 75. If you should get up machinery which would enable you to save the wages of three men per day in any special work, what saving per day would you make by the use of that machinery?

A. It would be saving the wages of three men, less the interest on the money expended.

C. Int. 76. Then if you should get up a machine for mending rails which requires three men at a fire either way, whether using your machine or the method known before that, and the men with your machine could do as much in one day as they could by the old mode in three days, how much would you save by the use of your machine?

A. Save the labor of two days, I should think.

C. Int. 77. Then that would be the value of the invention, would it not, in reality?

A. Certainly.

C. Int. 78. Have you in your office the annual report made by the officers of your road to its directors, for any number of years from 1856 to the present time?

A. For part of that time, yes.

1138 C. Int. 79. To whom do the different roadmasters make their reports, and how often?

A. They report expenditures once a month to the auditor's department.

C. Int. 80. Who is the auditor, and how long has he been auditor?

A. O. H. Smith; he has been auditor three or four years.

Re-direct:

Int. 29. Would you consider any invention valuable, the tendency of which is to encourage the doing of a thing unprofitable to do?

(Objected to.)

A. Of course, I would not.

Int. 30. Would you purchase or recommend the purchase of railroad bars of alternate sections of hard and soft metal?

A. I would not.

Int. 31. Would such rails be serviceable or safe in a railroad track?

A. They might be safe, but not economical.

Int. 32. Is it not the effect of mending railroad rails by patching to produce such bar or bars of alternate sections of hard and soft metal?

A. As generally done, I think it is.

Re-cross.

C. Int. 81. Do you ever purchase railroad bars of alternate sections of hard and soft metal?

A. I have not.

C. Int. 82. Do any of the roads, to the best of your knowledge, or did you ever hear of such a thing before?

A. Not as I know of.

MAX HJORTSBERG.

Subscribed and sworn to before me this 14th day of June, A. D. 1872.

H. W. BISHOP,

Master in Chancery of the Circuit Court of the United States for the Northern District of Illinois.

1139 United States circuit court, northern district of Illinois.

SAMUEL H. TURRILL
v.
ILLINOIS CENTRAL RAILROAD COMPANY AND John M. Douglas. } In chancery.

And in other cases, as per stipulation between the parties on record herein.

1140

1141 U. S. circuit court, nothern district of Illinois.

SAMUEL H. TURRILL
v.
THE CHICAGO, BURLINGTON AND QUINCY RAILroad Company, etc. } In chancery.

Testimony.

Testimony taken before Henry W. Bishop, master in chancery of said court, Monday, September 16, 1872.

Present: The complainant in person, John N. Jewett, esq., solicitor for defendants.

JAMES WALKER, a witness produced on behalf of the defendants, was, being first duly sworn, examined in chief by Mr. Jewett, as follows:

Int. 1. Please state your name, age, residence, and occupation.

A. James Walker; age, 39; residence, Aurora; occupation, blacksmith.

1142 Int. 2. Are you, and if so, how long have you been connected with the blacksmithing work of the Chicago, Burlington & Quincy Railroad Company at Aurora; and, if so, in what capacity?

A. I am; for fifteen years last 4th of June; I have been foreman of the blacksmith-shop all that time.

Int. 3. Do they mend rails at that shop now?

A. They do not.

Int. 5. Have they at any time mended rails at that shop since your connection with it; and, if so, when, and for how long a time? State as near as you are able to.

A. They have for about three years, commencing about '63, I think; I won't be positive.

Int. 6. State whether or not the shops of the company at Aurora have at any time been destroyed by fire; and, if so, when, and whether the records of the work done in said shops was preserved?

A. It was destroyed by fire some eight or nine years ago, I think; the books, all the general office books were destroyed.

Int. 7. Have you recently made examination of all the books that you can find relating to the rail-mending at the Aurora shops for the purpose of ascertaining the quantity of rail-mending done by the company at those shops?

A. I have.

Int. 8. What was the result of your examination?

A. Whole number of rails mended, 5,971. Whole number of feet of mending, 5,787 feet.

Int. 9. Did you see the books from which the memoranda referred to by you in making your last answer were taken?

A. This memorandum was taken from a book of memorandums relating to road-work, and was the only book which I could find relating to rail-mending which was preserved from the fire. That memorandum-book I saw.

Int. 10. Do you know that the memorandum from which you have testified was correctly taken from the book?

1143 A. I do.

Int. 11. About how long ago was it that the company stopped mending rails at the Aurora shop?

A. That question I can't answer exactly. It might seven, eight or nine years ago. I never paid any attention to it.

Int. 12. Do you know, if so state, why rail-mending was discontinued?

A. I have no positive knowledge. There was grumbling about their breaking in some cases, and that they cost too much.

Int. 13. Please state at what places the Chicago, Burlington & Quincy Railroad Company have mended rails at any time within your knowledge?

A. At Aurora and Galesburg.

Cross-examination:

X Int. 1. Is the shop where they repair rails at Aurora under your direct charge?

A. It is.

X Int. 2. To whom do the parties that repair rails or make frogs report the number of rails and amount repaired on them?

A. They reported it on a slate which I furnished them. The report was made to me.

X Int. 3. Did they keep the number of rails that were repaired, and the amount of repairing feet on them, and also frogs made in the shop, and report the same to you; how often and to whom did you make your report of this work done?

A. They did keep the number of rails and amount of repairing; they did not keep the number of frogs, but I kept the number of frogs as they were shipped away. They reported to me once a week. I reported to the book-keepers.

X Int. 4. What is the book-keeper's name, and what department is he in?

A. I don't know what book-keeper it was at that time; we had a number there, and I couldn't tell; it was in the locomotive department.

1144 X Int. 5. What year were the shops destroyed by fire at Aurora.

A. I couldn't tell, some 8 or 9 years ago.

X Int. 6. Has there been a correct record kept of the rail-mending, and the amount put on them since that time by yourself or anybody else?

A. The design was to keep a correct record of everything, but we can't find anything but the memorandum-book.

X Int. 7. In Amos T. Hall's answer as to the amount of work done since March 1st, 1865, the answer being filed the 9th day of April, 1869, he says they mended 8,172 railroad-bars, and they made 598 frogs. Where did he get this statement if the books at the Aurora shops do not show it; that is, since the fire?

A. I don't know where he gets the amount of rail. I have a private memorandum which gives the amount.

X Int. 8. Have you got it with you?

A. I have not.

X Int. 9. Do you make what is called the spring-rail frog?

A. Yes.

X Int. 10. How much welding of steel is put on the side-rails and the frogs in feet or inches?

A. I should say about eight inches on each frog, that is, on the iron-rail frogs.

X Int. 11. What year did they repair the most iron at the shops at Aurora?

A. I can't tell that.

X Int. 12. Do you know, of your own knowledge, as to how much rail-repairing has been done at Aurora?

A. I do not. I remember that we repaired rails there, but just how long ago I don't remember, nor how much was done.

X Int. 13. Did you ever know a man that worked there repairing rails by the name of Joseph W. Smith; if so, where was he from?

1145 A. I knew Joseph Smith. He came from Turner's Junction, Illinois.

X Int. 14. How long did he work at Aurora, and at what time?

A. I couldn't tell at what time or how long. My impression is he may have worked three or four months.

X Int. 15. How many machines have you had at the Aurora shops for repairing rails and making frogs, and do you use any of them at the present time for either purpose?

A. We have had three. We use them now as anvils. We have stopped making iron-rail frogs.

X Int. 16. Wasn't there repaired more rails some years than others?

A. I have no means of knowing.

X Int. 17. Don't you recollect anything about it?

A. No; I do not.

X Int. 18. Did you ever pay much attention to that branch of business?

A. I gave it equal attention with the other business. I made no speciality of anything.

X Int. 19. Would they or not do as much repairing on the rails at Aurora as they would at the shops in Galesburg?

A. I do not know, I couldn't answer that question.

X Int. 20. I have a memorandum taken from the annual reports, produced by the Chicago, Burlington and Quincy Railroad Company to Mr. Bishop, the master in chancery of this court, which were burnt in the Chicago fire, in Chicago, last fall, stating in the year 1867 the cost of repaired iron on that road to be $55,575.32. Do you know whether they repaired more iron that year than others?

A. I do not.

(Signed) JAS. WALKER.

1146 U. S. circuit court, northern district of Illinois.

SAMUEL H. TURRILL
v.
MICHIGAN SOUTHERN AND NORTHERN INDIANA Railroad Company. } In chancery.

Testimony.

Testimony taken before Henry W. Bishop, master in chancery of said court, Friday, September 13, 1872.

Present: The complainant in person, John N. Jewett, esq., solicitor for the defendant.

JAMES REDMOND, a witness produced on behalf of the defendants, being first duly sworn, was examined in chief by Mr. Jewett, as follows:

Int. 1. Please state your name, age, residence, and occupation.

A. James Redmond; age, 45; residence, Adrian, Mich.; occupation, blacksmith.

1147 Int. 2. Are you now, and how long have you been, connected with the business of the Michigan Southern & Northern Indiana and the Lake Shore & Michigan Southern Railway Companies?

A. I am now, and have been for about seventeen years and one-half.

Int. 3. Have you had to do with the rail-mending on the road of said companies; and, if so, in what capacities and what places?

A. I have, and as foreman of the rail-mending part of the time; all the time at Adrian.

Int. 4. By what means or machinery are rails now mended on said road?

A. The only machinery I know of is rolls called Bain's patent T-rail machine, driven by steam power, at Elkhart.

Int. 5. How many of them?

A. Only one that I know of.

Int. 6. How long has it been in use?

A. I am not positive, but my judgment is from the latter part of 1867 to the present time.

Int. 7. Were you acquainted with the different patterns or forms of blocks for mending rails by hand in use upon said road before the introduction of the Bain's machine?

A. I have been acquainted with what is known as blocks used for that purpose.

Int. 8. How many and what were the names distinguishing said blocks?

A. The best information I can get is there were about thirty-two blocks used. We know them by the names of the rack-and-pinion block, the Smith and Beebe block, the bayonet or La Porte block.

Int. 9. What was the number of each kind of blocks, as near as you have been able to ascertain?

A. As near as I can ascertain, there were eight of the rack-and-pinion block; there was twenty of the Smith and Beebe, and four of the bayonet or La Porte block.

1148 Int. 10. When was the mending of rails upon any or either of these blocks commenced on that road?

A. I know there were rails commenced mending in 1857 on four of these blocks, at Adrian, late in the fall—in December.

Int. 11. When were the Smith & Beebe blocks introduced at Adrian?

A. I think we commenced the use about August, 1862.

Int. 12. When were the bayonet or La Porte blocks put up?

A. I can't tell you exactly; it was after 1862, in my judgment.

Int. 13. Whilst in operation, has there been any material difference in the amount of work done on these several kinds of blocks?

A. I think there is a small difference in the amount of work done on the different kinds of blocks.

Int. 14. In favor of which form is this difference?

A. I think it would be in favor of the rack and pinion block.

Int. 15. At what time were there the most of these blocks in use upon your road?

A. I think between the years 1862 and 1868.

Int. 16. How much difference in the working of the several forms of blocks was there in your judgment?

A. I wish to explain that the cause of difference was this: that the rack and pinion block was adapted to a furnace that is blown by power; consequently it would heat the rail more rapidly than in open or bellows fires.

Int. 17. Working under the same conditions of fire and blast, would there be any material difference in the amount of work which could be done on these several forms?

A. I think there wouldn't be any material difference.

Int. 18. Have you had any practical experience in the mending of rails by the Baine machine?

A. No, sir.

1149 Cross-examination by Mr. Turrill:

X Int. 1. Have you been testifying from actual knowledge or from memorandums made as to the dates and number of the machines, etc.?

A. Partly from actual knowledge and partly from the best information I could gather from men who have worked in the different places.

X Int. 2. Who made the memorandums on the different pieces of paper you have referred to while giving your testimony?

A. I made them.

X Int. 3. Where did you get the dates as to the time the machines was changed, and the number of the different machines that were put upon the line of the road that you have testified to?

A. I got them partly from actual knowledge and partly from old-time books that have been in my office since 1857, knowing the men that worked on the rails, and being in different shops on the line of the road, and caused several of those blocks to be made and sent to those men.

X Int. 4. How do you know there were twenty of the Smith & Beebe pattern put up on the line of your road and in operation between 1862 and 1868?

A. From the best information I could get we were running so many open fires, and that block was better adapted to open fires than rack and pinion, and I caused several to be made.

X Int. 5. What has the block got to do with the kind of fire used, whether open as you call it, or where a furnace is used for heating the rail?

A. The rack and pinion block, when not in use, the jaws are thrown open and the rail lays between the jaws while heating, and the rail is drawn straight back from the furnace through those jaws and turned over and the jaws closed on the rail. The Smith & Beebe jaws remain closed while the rail is heating, and when the rail is hot they are
1150 opened by a treadle with the foot, and the rail carried and laid in the jaws, and the jaws drop down and clasp the rail also.

X Int. 6. Do you know whether what was the M. S. & N. I. Railroad proper, are mending any rails by any of these machines at the present time or in the past four or five years, than by the Baine process?

A. I don't know of their mending any at the present time; they have mended some inside of five years at Adrian.

X Int. 7. At any other place?

A. I am not positive.

X Int. 8. Do you have any business with any other shops on the line of the road except at Adrian in connection with the road?

A. I have not at present.

X Int. 9. Have you ever, and to what extent, and what was the nature of the business with the other shops outside of Adrian?

A. Adrian was the headquarters of that division of the road, the

eastern, and they got their supplies there. I had the fitting up of blocks of different places, and the making of tools for them.

X Int. 10. How many machines did you fit up for your division, and at what places were the shops when they repaired rails?

A. I can't tell you how many I fitted up; I made blocks and parts of blocks for Monroe, Marion, Kendallville, and Coldwater. At various times since the fitting up of shops I have had to make jaws and send to them. They wear out when the rest of the block don't.

X Int. 11. How often were you in their shops at the different places you have spoken of?

A. I couldn't tell you, sir.

X Int. 12. Have you been in them once a year from 1862 up to 1868?

A. No, sir.

1151 X Int. 13. Then what you know about these places outside of Adrian is from what you have been told by other parties?

A. Part of it is and part of it is from being in some of the shops and seeing some of the men working.

X Int. 14. Can you tell by looking over the old time books that you have spoken of, that you have at your shop, what kind of machines the men used, by those books in which the time was kept?

A. No, sir.

JAMES REDMOND.

1152 U. S. circuit court, northern district of Illinois.

SAMUEL H. TURRILL
v.
THE MICHIGAN SOUTHERN AND NORTHERN INDIANA RAILROAD, etc. } In chancery.

Testimony.

Testimony taken before Henry W. Bishop, master in chancery of said court, Friday, September 13, 1872.

Present: The complainant in person; John N. Jewett, esq., solicitor for the defendants.

DENNIS BRENNAN, a witness produced on behalf of the defendants, being first duly sworn, was examined-in-chief by Mr. Jewett, as follows:

Int. 1. Please state your name, age, residence, and occupation.

A. Dennis Brennan; age, 40; residence, Elkhart, Ind.; occupation, blacksmith.

Int. 2. Have you been, and, if so, how long, and in what ca-
1153 pacity, in the employment of the Michigan Southern and Northern Indiana Railroad Company, and the Lake Shore and Michigan Southern Railroad Company?

A. Yes, sir; nearly or about 18 years; worked in various capacities. I have been connected with the rail-repairs, road-work, can work engine-work, etc.

Int. 3. What is your present position in said company?

A. Foreman of the Elkhart rail-mills.

Int. 4. What machinery is now used upon said road for mending rails?

A. Hugh Baine's rolls.

Int. 5. How long have these rolls been in use on that road?

A. About 5 years, I think, to the best of my opinion. I am not really positive, but I think about that time.

Int. 6. Has the principal part of the rail-mending of said company been done upon said rolls during that time?

A. 6. Yes, sir.

Int. 7. What is the average length of weld per rail made by those rolls, as operated on that road?

A. A trifle over 33 inches per rail, as near as I can estimate it.

Int. 8. Prior to the introduction of those rolls, what machinery or machines were in use upon that road for mending rails?

A. They used the ordinary or common T-rail blocks then in use, of different patterns and names. Some claimed to be one patent and some another.

Int. 9. What were the ordinary names by which these different patterns were known and distinguished?

A. The blocks were generally designated by the Smith & Beebe block; the rack and pinion, represented by the mahogany model now shown me; worked the Cleveland vise; also used the block known as the bayonent-block.

(Admitted by the parties to be the machine designated in the testimony as the Michigan Southern machine, or the La Porte machine)

1154 Int. 10. How many in all of these different patterns of machine have been in use upon said road?

A. Thirty-two.

Int. 11. How many of each pattern?

11. Twenty of the Smith & Beebe, 8 of the rack and pinion, 4 of the bayonet or Michigan Southern.

Int. 12. How would these several patterns compare as to the amount of work done upon them individually?

A. I neve rknew any particular difference; never could see any.

Int. 13. Have all these thirty-two machines been in use all the time of your connection with the road?

A. No, sir.

Int. 14. When did the Michigan Southern and Northern Indiana Railroad Company first begin to use any of these forms of machine?

A. In the fall of '56.

Int. 15. Which was the form first used?

A. Rack and pinion.

Int. 16. How many were in use from that time up to 1861?

A. There were four put in use at that time, all of the same pattern, at Adrian, Michigan. They were gradually increased along. I could not give the dates in which they were put in.

Int. 17. When were the Smith & Beebe machines first introduced?

A. In 1862; four were put in at Adrian. They were gradually put in from time to time along the line to the amount of twenty.

Int. 18. When were the machines, which you call the bayonet or Michigan Southern, introduced on the road?

A. I am not positive about that, but I think it was about the spring of 1865.

Cross-examination by Mr. Turrill:

1155 X Int. 1. Do you know of your own knowledge what year Hugh Baine's machine for repairing rails was put up at Elkhart?

A. I don't know as I could answer that positive; 1867, I think.

X Int. 2. Wasn't it in the fall of '68?

A. I am not positive; it was some time about that time.

X Int. 3. How many rails have been repaired by that machine?

A. I couldn't answer that.

X Int. 4. Do you keep any account of the number of rails repaired by that machine?

A. Yes, sir.

X Int. 5. Have you those accounts at the shop at Elkhart with you?

A. I have them at the shops in Elkhart since I have had anything to do with it.

X Int. 6. How long have you had charge of the repairing of rails by Baine's machine at Elkhart and kept the account of the number of rails repaired?

A. Since January, '70.

X Int. 7. Who had charge of it before you went there?

A. William O. Williams. He is dead.

X Int. 8. Have you, since January, 1870, kept the account of the number of rails repaired and the amounts of welding or patching put on the same?

A. Yes, sir.

X Int. 9. Will you, on your return to Elkhart, make a correct statement of the number of rails repaired each year, and the amount of patching put on them during the time you have kept it, and also give a like statement for the amount done before you, if it so can be found in the books of the company's shops there, and send the same to John N. Jewett, at Chicago?

A. I will, providing that it is satisfactory to my employers.

1156 X Int. 10. Who do you make your returns to of the amount of work of repairing rails at Elkhart since you have had charge of the shop?

A. To the chief-engineer's office, to Charles Paine, and, since he has been promoted, to H. H. Blodgett, chief-engineer of the southern division at La Porte. I report every night.

X Int. 11. Were you ever examined as a witness in regard to Cawood's patent?

A. Yes, sir.

X Int. 12. When and where?

A. At Detroit. I can't give you the date; I think it was about 1862.

X Int. 13. Where did you live and work at that time, and in what capacity?

A. I lived at Adrian, Michigan; I had charge of the rail-shop there at that time.

X Int. 14. Did you have any of the Beebe & Smith machines in use at that time in the Adrian shop? If so, how many?

A. Yes, sir; I think we had four.

X Int. 15. Will you look at model "Exhibit A, E. B. G., notary public," and state whether it is or is not like the machines used on your road, operated by a rack and pinion?

A. Yes, sir; this is about the principle; I wouldn't be exact as to every little thing about it, but I think, as near as possible, about the same principle.

X Int. 16. About how long was you located in Adrian in charge of the rail-shop?

A. I commenced working there in January, '55, and I left there a few months and came back again and took charge of the shop, I think in '59. I left the shops in '64.

X Int. 17. What did you do after you left the rail-shop in '64, at Adrian?

A. I took a contract on the road of cutting wood on the east and northern division.

1157 X Int. 18. How long did you follow that business, and what have you done since, up to 1870?

A. Well, I have been in various businesses; I worked for the company awhile by contract; I put up a great many crank-switches for them; the balance of the time I put up some patent switches, and I guess after that I went to work for them at Elkhart.

X Int. 19. Did you ever have anything to do in any shop on the line of the Michigan Southern and Northern Indiana Railroad, in repairing rails, other than at Adrian and Elkhart?

A. No, sir.

X Int. 20. Do you know, of your own knowledge, how many Beebe & Smith machines were put up and used at different points on the line of that road, and when, or any other different pattern, except at Adrian?

A. I know about the blocks being put up at other places; I know about their being made at Adrian.

X Int. 21 Did they make these blocks at Adrian?

A. Yes, sir.

X Int. 22. Will you look at the model marked "Beebe & Smith's patent, June 9th, 1857," and state whether the Beebe & Smith machines, used on the M. S. & N. I. road, are correctly represented by it?

A. That is a fair representation of the block.

X Int. 23. Is there any difference in the Beebe & Smith and the rack and pinion or other patterns referred to by you in supporting the rail between the jaws while the patch is being welded on?

(Objected to.)

A. I don't know of any material difference, unless they are so made to make a difference.

(Signed) DENNIS BRENNAN.

1158 U. S. circuit court, northern district of Illinois.

SAMUEL H. TURRILL
v.
THE MICHIGAN SOUTHERN AND NORTHERN INDIANA RAILROAD, etc. } In chancery.

Testimony.

Testimony taken before Henry W. Bishop, master in chancery of said court, Friday, September 13th, 1872.

Present: The complainant in person, John N. Jewett, esq., solicitor for the defendants.

JAMES T. CLARK, a witness produced on behalf of the defendants, being first duly sworn, in answer to interrogatories propounded by Mr. Jewett, doth say as follows:

Int. 1. Please state your name, age, residence, and occupation.

A. James T. Clark; age, 40; residence, Galesburg, Ill.; occupation, road-master for the Burlington and Quincy.

Int. 2. How long have you occupied that position?

1159 A. Fifteen years.

Int. 3. In that connection have you had anything to do or had any experience with rail-mending?

A. I have.

Int. 4. Can you state the amount of rail-mending done at the shops of the Chicago, Burlington and Quincy Railroad Company, at Galesburg; and, if so, for what time?

A. I can, and for the years 1862 to 1872, inclusive.

Int. 5. Please state the amount of mending during each year of the time mentioned, giving the number of rails mended, the number of feet, and cost per foot, as nearly as may be.

A.

Year.	No. of rails.	No. of feet.	Cost per foot.
1862	1024	2243	$0 51 32-100
1863	2159	6471	0 74 18-100
1864	3850	10,244	1 14 28-100
1865	3253	8583	1 22 61-100
1866	2650	6852	0 97 84-100
1867	1934	4146	1 08 55-100
1868	1557	3572	1 12 53-100
1869	1784	4172	1 02 61-100
1870	1361	3330	1 14 70-100
1871	981	2596	1 06 33-100
1872	298	524	1 00 76-100

Int. 6. Have you any means of telling the amount of rails mended prior to 1862? And, if not, state the reason.

A. I have no means of telling, for the reason that I did not have charge of the rail-mending before that.

Int. 7. Was there any record of it kept prior to that time, that you know of?

A. There was no record kept that I could find. It was kept in the locomotive department, if any, and they tell me there was none kept.

Int. 8. Do you know, and, if so, state, to what extent rails were mended at Galesburg, on that road, prior to that time?

1160 A. They were mended during only one winter before that time. Two fires were run about four months during that year. I do not remember what year. I think it was the winter of 1856–'7.

Int. 9. About what number of rails were mended during those four months, according to your judgment?

A. I have no means of telling. I should judge they would mend about five to seven rails a day on each fire, possibly more.

Int. 10. Where have the mended rails been principally used on the Chicago, Burlington & Quincy Railroad?

A. Fully nine-tenths of them have been used on side-tracks.

Int. 11. What has been the result of your observation as to the wear and durability of mended rails?

A. Well, I can only say as to those used in main track. My opinion is very unfavorable as to their utility and safety in main track.

Int. 12. Please give your reasons, based upon your experience in such use of mended rails.

A. My experience has been that they are liable to break, and that it is hard to keep the joints in the track, in consequence of the inequality in the height of the rails.

Int. 13. At what point is this liability to breakage developed in mended rails?

A. Generally at or near the end of the weld.

Int. 14. Can you give any explanation of such liability to break at that point?

A. I have supposed it to be caused by the burning or overheating of the iron, and the liability of the joints of the rail to pound down in consequence of the inequality in the height of rails, making the joint tie become loose in its bed, and the bearing come principally on the shoulder-tie, or the tie next the joint-tie.

Int. 15. Does the Chicago, Burlington & Quincy mend rails at the present time by patching?

1161 A. No, sir.

Int. 16. For what reason?

A. The reason I don't do it is because I don't think it pays.

Int. 17. What is done by you with rails that have become broken down at the end or otherwise unfit for use in the main track?

A. I take them to a shop I have for the purpose, heat them to a red heat near the worn place in the rail, saw off the worn part, and punch the balance for splicings, and use it again, sending the worn part that was sawed off to rolling-mill.

Int. 18. What effect does this heating of the rail to a red heat, if any, have upon the iron?

A. I have only used that process since last February, (1872,) and can't tell to any certainty yet. It don't show any bad effect, so far; we are using about fourteen to sixteen miles of that iron in main track now; it works well, so far.

Int. 19. Is this red heat you speak of a welding heat, or anywhere near it?

A. Oh, no, sir; very much short of it; we only heat it enough to soften the rail so it can be sawed.

Int. 20. How many different lengths of rail are now in use upon the C., B. & Q. Railroad?

A. Well, we have them all the way from six feet to thirty feet—all intermediate lengths.

Int. 21. What effect upon the iron of the rail, as to its quality and hardness, does heating it to a welding heat have if allowed to cool gradually without being worked?

A. Not being an iron-worker, I could not give you an intelligent answer.

Int. 22. Have you ever observed at what point a mended rail is most liable to wear away, the ordinary use of a railroad track?

A. So far as I have noticed, the wear is just back of the weld.

1162 Int. 23. Suppose it to be the fact that the portion of the rail immediately back of the patch is made softer by the process of heating, and not being worked or condensed by hammering, remains permanently softer than the remaining portion of the rail, how would such a rail wear in the ordinary use it receives in the track?

A. I should think that the soft portion of the rail would wear out first.

Int. 24. When an inequality in the wear of the rail is once developed, does it or not proceed with greater rapidity as the wear becomes greater?

A. I should say it does very much, and in some kinds of iron more than others a great deal.

Int. 25. How many trains per day run over the C., B. & Q. Railroad?

A. Thirty-six to forty.

Int. 26. What would be the average number of cars in these trains, taking passenger-trains and freight-trains separately?

A. I should judge the average number of cars in passenger-trains would be 5; the average number of cars in freight, 20.

Int. 27. How many wheels would come in contact with each rail in those trains, including locomotive and all?

A. There would be an average of over four wheels on each side of each car, and over four wheels on each engine; we have some cars with some four, some cars six, and some eight-wheel trucks, and eight and ten-wheel engines.

Cross-examination by Mr. Turrill:

X. Int. 1. When did you first commence work for the C., B. & Q. Railroad?

A. Eighteen years ago the third day of last April.

X. Int. 2. What did you do before you acted in the capacity of road-master?

1163 A. I acted as steward for track-layers and graders; then a section foreman until March, 1856; from that until November, 1856, I believe was the date, I acted as construction-train conductor. I am not so positive as to whether it is '56 or 57; then took charge of a portion of the road as road-master, and have been since acting in that capacity.

X Int. 3. When did the C., B. and Q. Railroad first commence the repairing of rails at Galesburg, to the best of your knowledge?

A. I think in the fall or winter of 1856.

X Int. 4. Do you know how many machines they had in use at that time?

A. I don't know for a certainty; the first rails that I saw repaired there, they were using two fires and two blocks; that was in the fall of 1856; that is my recollection of the date.

X Int. 5. Were these machines in general use up to the time in which you have given your statement in your direct examination?

A. No, sir; they were not.

X Int. 6. How much of the time were they in use during the different years, to the best of your knowledge?

A. To the best of my knowledge, they were not in use after April or May, 1857, until some time in 1862, July 17th.

X Int. 7. Why were they not in use between those times you have spoken of?

A. The first reason is, that the ground occupied by the shop was needed and used for track room, and the shop taken away; the next was, that the men in authority on the road did not think it paid to repair rails, and got some rerolling done.

X Int. 8. Do you know how many rails they used to average to repair per day in the winter of 1856 and 1857 to each machine; was the repairing at that time more or less per rail than since 1862?

1164 A. I do not know how many they did repair per day, but I think they repaired more than after 1862; I don't think they put on as much patch before 1862 as since, but think they turned out more rails in number; their facilities were better for heating, as they used power blast, as since 1872 they have used hand-bellows.

X Int. 9. What time in the fall of 1856 was it, to the best of your knowledge, that you first saw those two blocks in operation?

A. I think not earlier than October.

X Int. 10. Was that the first that the machines were put up in operation, or the first that you saw them?

A. I don't know when they were put up, but that is the first I saw

them, and I understand from others that that was the commencement of repairing rails.

X Int. 11. To the best of your knowledge, about what number of rails did those two fires turn out per day, from October, 1856, to May, 1857?

A. I have no means of telling positively how many; I should judge five to seven or eight for each fire.

X. Int. 12. Are you a practical blacksmith?

A. No, sir.

X Int. 13. Did you ever work any at blacksmithing or any kind of trade in metal?

A. No, sir.

X Int. 14. Do you know whether a piece of iron which has been heated to a welding heat and cooled by lying in the air, is harder or softer after being so heated, than it was before, from the best of your knowledge?

A. I do not.

X Int. 15. Are not rails, when laid in the track, the top surface level at the joints and other portions of the rail?

A. That depends upon circumstances altogether. If one rail is of a greater height than the others, it cannot be laid with any ordinary
1165 chair or splice so as to bring the top surfaces of the two rails on a level with each other.

X Int. 16. If you were putting down a four-inch rail in height, and then put in one that was not but three and a half inches next to it, would you have the top surfaces at the same height, or the bottom as low down as the four-inch rail?

A. I should lay the top surfaces of equal height.

X Int. 17. In your answer to direct interrogatory fourteen, "I have supposed it to be caused by the burning and overheating of the iron and the liability of the joints of the rail to pound down in consequence of the inequality of the height of the rail." Now, if the rails are all laid with the top surfaces level, how does that effect the wearing of the rail immediately back of the patch any more than any other portion of it?

A. If the top surfaces are laid level the inequality immediately at the joint would not affect the wearing of the rail back of the weld, but they are not so laid in practice generally.

X Int. 18. Are not fish-rails so laid and supported at the joint so that one rail is just as high as the other at the joint?

A. No, sir; not if the rails are of an unequal height, providing fish-bars are used, from the fact that the holes for the bolts of the fish-plate, the bottom bearing of the fish-plate, the top bearing of the fish-plate, govern the position of the rail as regards its length.

X Int. 19. Do not you always, in laying fish-plate or any other kind of rails in the track, have them all of the same height on top at the joints?

A. We do, as near as we can. It cannot be done with fish-plates; but where there is much irregularity in the height of the two rails that join we use what we term a step-chair.

X Int. 20. Do you know anything about mending of rails at any other point on the C., B. & Q. except at Galesburg?

A. I do not.

1166 X Int. 21. At what point or portion do new rails which have been laid in the track wear out first?

A. If laid with chair, they are more likely to give out at the ends. If well laid with fish-plate, I don't think there is much difference in the wear.

JAMES T. CLARK.

1167 *Testimony.*

Depositions of witnesses on the part of the defendants, taken before Henry W. Bishop, esq., United States commissioner, at Chicago, November, 1873.

HORATIO LEWIS.

1. Q. What is your name, age, residence, and occupation?

A. Horatio Lewis; Oneida, Madison County, New York; occupation, blacksmith.

2. Q. How long have you been employed in the blacksmith business?

A. Well, I have always been engaged in that business—pretty much my whole life. My father was a blacksmith and brought us up to it—gave us the trade.

3. Q. Have you, during any portion of the time you have been employed as a blacksmith, been engaged in mending railroad-rails; if so, where, for how long, and in the employment of what company?

A. I have been in the employ of the New York Central. Or first, I commenced with the Syracuse and Utica Railroad, before the consolidation. After their consolidation we were in their employ, and have been for, I think, nearly twenty years, ever since the consolidation.

4. Q. Ever since the consolidation you have been in the employ of what company?

A. The New York Central. I think it was in 1853 that they were consolidated.

1168 5. Q. Have you been mending rails for the company, or for yourself by contract, for the company?

A. My work ever since the consolidation has been by contract.

6. Q. C. And when, as nearly as you can remember, was it that you first commenced repairing rails by contract?

A. I think it was in the month of July, 1853.

7. Q. At what place?

A. At Oneida, where I now reside.

8. Q. Have you not been continuously in that business since that time?

A. Yes, sir.

9. Q. Are you still engaged in mending rails for the New York Central Railroad Company?

A. I have been up to the first of this month. I am not now in the employ of the road, directly.

10. Q. Are you still engaged in the business of mending rails in any way?

A. Up to the first of November.

11. Q. Are you still engaged in that business?

A. My contract with the road is closed, and it is pretty much played out with me.

12. Q. What sort of anvil have you been accustomed to use in your business of mending rails?

A. I have used a patent block a short time, but I have used for my principal working the old common grooved block.

13. Q. State the dimensions of the anvil-block which you have generally used.

A. My best judgment would be—though I never measured it—that it is about sixteen or eighteen inches square. I think it is a little longer one way than the other.

14. Q. With or without grooves?

A. With grooves.

15. Q. What was the design of these grooves?

1169 A. They were designed to form one-half the rail, while lying on the side, for the purpose of forming one-half, while the swage was used on the top of the rail, to keep the rail in shape.

16. Q. And those grooves are a counterpart of the side of the rail?

A. Yes, sir, intended to be.

17. Q. What kind of rails have you been in the habit of mending during this time?

A. I have repaired most all of the different sizes and different patterns of rails that has been used on our road, especially on that division.

18. Q. State what patterns and kinds of rails were being used on that road.

A. The first iron we had was an English iron, purchased by John Wilkinson, as I was informed. The next pattern I repaired was what we called a four-inch iron, and some that was three and a half, of a very small pattern; the waist was not the same height, or the neck between the flange under the rail; we sometimes termed it the waist.

19. Q. Any other kinds?

A. Yes, sir; I had the repairing of what we called the fish-joint rail; the next was what we called the flat-top rail, manufactured at Rome; that was three and a half—was the three and a half inches; the last was the fish-joint rail.

20. Q. How long have you been engaged in repairing the fish-joint rail in connection with the other forms?

A. I have had more or less of it; my impression is that for some five to eight years we have had more or less of it on our road.

21. Q. You have spoken of using a patent block for a short time; give a description of the block which you used.

A. Well, this patent block is quite a large concern; it has jaws; there is an anvil portion, and on the side here are the jaws; on the left of the anvil are two large clamps coming up; both these jaws with the

1170 patent clamp that I have used are movable, and are used with a lever on the side here, which throws them open, and the jaws catch right under the tread of the rail, and holds the waist of the rail, so that the surface of the rail is on the top of the clamps.

22. Q. How are these two movable blocks moved?

A. With a lever placed on the outside, where we could throw them open with the foot.

23. Q. What was the general shape of these two movable jaws?

A. The general shape is what carpenters would call an O G, with an arm off to the foot of them.

24. Q. Is it a wedge-shape, in general configuration?

A. The center of the block is smooth-faced, I think.

By Mr. CURTIS. That is, the Davis machine, I think, and is not in any of these cases.

25. Q. When did you use this block—about when?

A. Well, it was about the time they commenced repairing the fish-joint rail, some five or eight years ago; I could not state positively.

26. Q. Prior to using that block, had you repaired the fish-joint rails?

A. I had done some at it.

27. Q. How long did you use the clamp-block?

A. I used it about four days.

28. Q. Did you resume it after that trial?

A. I never used the clamp since.

29. Q. What was your reason for rejecting it?

A. The time it took in getting my rail out of the block would lose

my heat on some portion that I could finish by one heat without the block.

39. Q. What effect upon the heat of the rail would putting the rail into these clamps have?

1171 A. The clamps, of course, being cold, and a large surface, has a tendency to chill the rail, and get it out of a welding-heat before you can get it out of the jaws.

31. Q. Did you, or not, find the clamp of any advantage in the mending of rails?

A. I did not, in my business.

32. Q. What did you return to for mending rails after trying to mend with the clamp?

A. I repaired rails with the common anvil, as I before described.

33. Q. You have continued to mend rails since the fish-joint rail came into use, have you?

A. Yes, sir.

34. Q. Please describe the preparation or the process of preparation of the rail for mending.

A. Preparing the rail prior to mending?

35. Q. The whole process prior to putting on the patch.

A. The way I have practiced mending for several years past, I never have made any preparation prior to putting on the patch, unless there was a large wastage of rail, a large piece broken off; if there was, I would sometimes tack on a piece, and then put my piece right on.

36. Q. Have you been in the habit of scarfing before putting on the patch?

A. I did several years ago, but not lately; have found it of no advantage.

37. Q. What has been the character of the damage of the rails which you have repaired at your shop?

A. Well, we have had some portion of the year a very fair class of rails; other portions of the year they are pretty bad.

38. Q. I will ask you what is the magnitude of the traffic upon the New York Central Railroad, as compared with other roads?

A. The traffic is immense; trains are running very rapidly most all hours of the day.

1172 39. Q. Do you know, if so, state, the extent of damage to the rails used upon its track as compared with those of light traffic; would it be much more?

A. It would be much greater.

40. Q. Do you repair rails in all degrees of damage as to the amount to be repaired?

A. Yes, sir; in the middle and at each end sometimes.

41. Q. Do you find any difficulty in repairing the fish-joint rail upon this smooth anvil or swage-block?

A. Upon the anvil portion of it?

42. Q. Yes.

A. No, sir.

43. Q. Do you make any difference between the ordinary T-rail and the fish-joint rail in the price in mending in your contract with the railroad company?

A. No, sir.

44. Q. It is all done under the same contract?

A. Yes, sir.

45. Q. Please state what has been your contract-price for mending

rails on the New York Central Railroad for the last twelve or fifteen years?

A. My judgment would be, for the last fifteen years, that our contract has been five shillings per rail.

46. Q. What does that include?

A. Good, bad, and indifferent.

47. Q. What did you furnish in your contract towards mending the rails?

A. I furnished all the labor, coal, tools, all my own tools; what the company furnishes is the iron which we use for the patch or for the rail.

48. Q. Did you furnish your own blast or bellows?

A. Yes, sir; I used a fan.

49. Q. Did you furnish that yourself?

A. Yes, sir.

1173 50. Q. Then all the company furnished is, as I understand it, the shop and the iron?

A. They have never furnished the shop for me. I have had to build on quite a portion of the shop.

51. Q. Then you furnished the blast, labor, and tools, and fuel, did you?

A. Yes, sir.

52. Q. And mended rails at sixty-two and a half cents per rail?

A. Yes, sir.

53. Q. And you have done this for the last fifteen years, I understand you?

A. I have been at it for over fifteen years. I think it is upwards of that time.

54. Q. What dimensions of iron do you use in mending rails?

A. The principal size that we use is two and a half inches by one-half inch.

55. Q. Does or not the width of the iron that you use depend upon the width of the rail to which the iron is to be applied?

A. Yes, sir.

56. Q. What other widths than two and a half inches by one-half inch do you use?

A. Two inches by one-half inch.

57. Q. What is the weight per foot of iron two and a half inches wide by one-half inch thick?

A. I have never had occasion to weigh it precisely, but my best judgment would be five pounds to the foot.

58. Q. In mending the old T-rail that you have mentioned, was it not necessary that the rail should be maintained at a certain height and thickness?

A. It was for a certain time.

59. Q. Did you have any difficulty in preserving the form or waist of the rail in mending upon the smooth anvil?

1174 A. No. I generally chip off a little of it if it is needed.

60. Q. For what purpose?

A. So that it will meet the chair.

61. Q. Is it not necessary that the web or waist of the rail should be preserved substantially in the same proportion?

A. Yes, sir.

62. Q. How do you succeed in doing this on a smooth anvil?

A. I heat as soon as possible the rail I want to repair, and use a light hammer in welding the patch.

63. Q. Is there any difficulty in doing this?

A. I never had any difficulty.

64. Q. How do you arrange the iron for heating the face of the rail so as to avoid heating what you do not wish to heat?

A. I don't cover the rail. I build my fire up to the rail—up to the flange—pack the coal around it.

65. Q. How do you put the rail into the fire?

A. With the flange of the rail up.

66. Q. You pack the coal up around the waist?

A. Yes, sir.

67. Q. In case that notwithstanding this you should thicken up the waist, how would you fix it?

A. I merely chip out a little with a cold-chisel while it is hot.

68. Q. Is there any difficulty in doing that?

A. No, sir.

69. Q. Do you experience any difficulty with the holes in mending in this way?

A. The holes will sometimes close down a little. I take a half round and cut them out a little.

70. Q. Is there any difficulty in fitting the bolt to the hole by this process?

A. No, sir.

1175 71. Q. About how many rails do you mend at one fire, on an average, per day of ten hours?

A. We calculate to get out sixteen, though some days we get out more, and some days fall short some.

72. Q. What will the number of rails which you can mend depend upon?

A. We calculate upon averaging, with a foreman and two helpers, enough to earn our ten dollars in a day of ten hours.

73. Q. Will the number of rails depend at all upon the length of the patch mended?

A. Of course that has something to do with the day's work.

74. Q. Have you ever made any experiment in order to ascertain how many rails you could mend in a day of ten hours?

A. I have.

75. Q. How many have you mended in a day?

A. I mended one day—we had a little strife; I had a man that thought he was very smart—I mended thirty-five rails in one day.

76. Q. What was the average mend per rail for that day?

A. The average for that day would perhaps be not far from eight to ten inches.

77. Q. What, in your judgment, has been the average mend per rail, taking the rails as they have come to you, upon the New York Central Railroad since you have been at work for that company—the number of inches?

A. I should think we were doing on an average not far from sixteen inches the average.

78. Q. Do you remember any extraordinary mends that you have made?

A. We have mended some quite large pieces.

79. Q. How long upon a single rail?

A. What, any time during my work?

80. Q. Yes.

1176 A. I once put on eight feet on a single rail.

81. Q. I will ask you if you have put as much as two feet on per rail?

A. Yes, sir.

82. Q. Please state the range of mend per rail as they came to you in your work, the lowest and the highest?

A. Well, some rails didn't want over from four to six inches, then we had some two feet, occasionally two and a half.

83. Q. You frequently have rails to mend upon both ends?

A. Very commonly.

84. Q. And in the middle?

A. Yes, sir.

85. Q. Please state what has been the expense of your help in repairing rails?

A. Before the war I paid six and seven shillings a day to my helpers.

86. Q. And to your blacksmith?

A. One dollar and a half a day.

87. Q. Since the war?

A. Along after the commencement of the war, when things began to advance, I had to pay seven shillings, a dollar, nine and ten shillings, and finally twelve shillings a day to my helpers, and to the blacksmith two dollars and a half.

88. Q. How much have you paid for the last ten years to your helpers and blacksmith, on an average?

A. The average has been for the last ten years, for helpers one dollar to ten shillings, and the blacksmith eighteen to twenty shillings.

89. Q. What amount of coal have you consumed at one fire, as near as you can estimate it?

A. I have not estimated my coal of late years. I should think in the neighborhood of three hundred pounds of coal a day would run a fire.

1177 90. Q. What kind of coal have you used for your furnace?

A. Blossburg coal.

91. Q. What has been the average price of that coal per ton?

A. It has averaged about six dollars per ton, sometimes six and a half, and I have sometimes got it for five and a half.

92. Q. How many fires have you commonly run in the course of your rail-mending business?

A. Two, ordinarily.

93. Q. Did you usually, for a while, superintend one fire and work at the business of mending rails?

A. Yes, sir.

94. Q. Have you done that up to the time of quitting the business the 1st of the present month?

A. No, sir; not generally. For about twelve or fourteen years I was at a fire most every day.

95. Q. Worked at the business?

A. Yes, sir.

96 Q. One of these fires you were working at, and the other one was run with hired help?

A. Yes, sir.

97. Q. Did your fire that you run, and the one you run with hired help, mend about the same?

A. I never could get a man that would succeed in getting out as many as I would get out by from two to four.

98. Q. What was the average number of rails that was got out at the fire run by hired help?

A. I don't think that the fire run by hired help entirely would average me much over fourteen rails a day.

99. Q. The fire that you worked at would average how much?

A. That would average from sixteen to eighteen; some seasons I would mend twenty-five a day.

1178 100. Q. When you speak of a day, how many hours do you mean in all cases?

A. Ten hours.

101. Q. From your experience in mending rails, both upon the smooth anvil with the swages and upon the clamps, which would you prefer to mend rails upon if you were mending by contract, as you have been for the last ten or fifteen years?

A. I would prefer the common anvil.

102. Q. Why?

A. For the reason already stated, the time lost in taking them out of this clamp; I should be in favor of the old grooved block.

103. Q. Could the rails, as they came to you, be mended as successfully upon the smooth anvil as upon the clamps?

A. Yes, sir.

104. Q. According to your experience and judgment, on which form of block could you accomplish the most mending per day?

A. So far as using the jaws, with the clamps or without?

105. Q. Yes, sir.

A. Oh, I could mend more rails without the clamps per day.

106. Q. And could mend quite as well?

A. Yes. sir.

107. Q. And did this apply to the fish-joint rail as well as to the common T-rail?

A. Yes, sir; both kinds.

108. Q. Look at this exhibit marked "Exhibit, Bebee & Smith," and state whether it represents accurately or in part the block that you used?

A. No, sir; it is not the block.

109. Q. Does it not bear any resemblance to it?

A. Nothing of the resemblance, except the surface.

110. Q. The die was the same, was it not?

1179 A. Well, very near, but the lower portion of the die or clamp was nothing like that we used.

111. Q. Did the jaws open in the same way that this model does?

A. No, sir.

112. Q. Did the jaws lift out something in the same manner?

A. The jaws lift right back. The other works with an arm with a knuckle.

113. Q. If I understand it, both the jaws are moved by means of a lever, and let the rail into the jaws?

A. Yes, sir.

114. Q. And they hold the rail when in the jaws, substantially as the machine built according to that model?

A. Well, very similar.

115. Q. Is that machine about your shop at the present time?

A. Yes, sir.

116. Q. And has not been used for some four or six years?

A. Never used. The clamps lies in the shop. I never used them but about four days. I gave them a good, fair trial.

117. Q. Will you state again, definitely, what number of men you employed at one fire?

A. I generally worked three men to the fire.

118. Q. What were these men?

A. Two helpers and a blacksmith.

119. Q. What sort of a blast did you use whilst employing a blacksmith and two helpers?

A. I commenced repairing rails all by hand, using a bellows.

120. Q. If you made a change in this respect, when did you make it, and what did you substitute in place of the bellows?

1180 A. Well, I should think about fifteen years ago, in that neighborhood, twelve or fifteen years ago, about near the time the company cut down on the price to five shillings, I found I wanted improved facilities.

121. Q. What did you substitute?

A. A fan.

122. Q. Did you reduce the number of men at a fire in consequence of the substitution of the fan for the common bellows?

A. I did a portion of the time. I had one helper with the blacksmith.

123. Q. Could you mend as many rails with the fan-blast, with one helper and one blacksmith, as you could before, with the common bellows and two helpers?

A. Yes, sir; I could mend more with the fan and two men.

124. Q. You could mend more with a fan and two men than you could with the bellows and three men?

A. Yes, sir.

125. Q. Is there or not in the mending of your railroad-iron in the manner you have stated, any wastage of iron?

A. There is a small wastage, with the fish-plate where we cut off, while with the T-rail there is no waste.

126. Q. What is done with the waste?

A. We chip it off and throw it in with the scrap-iron.

127. Q. Is it subsequently utilized?

A. Yes, sir; they pick it up about once in thirty, sixty, or ninety days along the road.

128. Q. And ship it off?

A. Yes, sir.

129. Q. How much would this wastage amount to in a day's work at one fire?

A. With the fish-rail?

130. Q. With either kind?

A. We never have any wastage with the old T-rail; with the fish-rail there is a small waste. I don't think it would average more than a couple of pounds a day.

1181 131. Q. State what is the object of taking out these small pieces.

A. In order that the fish-plate should fit.

132. Q. About what was the average earnings per day, under your contract, at sixty-two and a half cents per rail at each fire?

A. The average earning of each fire per day?

133. Q. The earnings of each fire per day.

A. My fire did not work steadily on rails every day.

134. Q. I mean what it was for steady work for ten hours?

A. Well, the average perhaps would be about eighteen dollars a day; very near that.

135. Q. At two fires?

A. Yes, sir; perhaps it would fall short of that through a whole month. I think it would fall short of that a trifle.

136. Q. How much in feet of mending, where you worked the whole day, would be accomplished at each fire?

A. We never mended by the foot. Our average, I think, has been not far from sixteen inches to the rail.

137. Q. And if you averaged sixteen rails per day, how many feet of mending would that make?

A. I will have to figure it up. It would be about twenty feet a day; I should think twenty-one and one-third feet.

138. Q. Is there any difference in your judgment in the amount of iron required, whether you mend upon the smooth anvil or upon the clamps?

A. No, sir; my judgment is that it would take the same amount of iron.

139. Q. In either case?

A. In either case.

140. Q. What kind of men, with regard to their skill and ability to work in iron, do you demand in order to mend railroad-bars?

A. It wants a good blacksmith.

1182 141. Q. Why?

A. It takes a man that knows how to keep a good fire and make good heats, and make a good weld.

142. Q. What is one of the most important things in making a weld?

A. To have a good heat.

143. Q. Does it make any difference whether you use plain blocks or clamps as to the skill required to secure a good heat?

A. No, sir.

144. Q. I will ask you, Mr. Lewis, if you have found your contract with the New York Central Railroad a profitable contract to yourself?

A. I have made a very fair living at it.

145. Q. Has this been your principal business since 1853 or 1854?

A. Yes, sir; it has been my principal business. I have been engaged in another outside matter, but that has been my principal business.

146. Q. Suppose a rail should come to your shop to be repaired, which is splintered, and with fragments sticking out upon the sides, how do you proceed to mend such a rail?

A. If that fragment is larger than a scale, I just take a cold-chisel and cut off the fragment, and if that affects the rail too much, I tack on a small piece.

147. Q. Suppose the crown of the rail has a considerable of a fragment split off?

A. I put it into the fire and weld it on.

148. Q. Then put the patch on?

A. Yes, sir.

149. Q. In this way do you save substantially all the iron that comes into the shop?

A. Yes, sir; I used to require $2\frac{1}{2}$-inch by $\frac{3}{4}$-inch iron; but by saving these splinters in this way I found that $2\frac{1}{2}$-inch by $\frac{1}{2}$-inch iron answered every purpose.

1183 150. Q. In case there is a rail brought in that requires mending for eighteen inches, the rail being pretty badly battered, do you make any preparation of the iron which is to compose the patch before putting it on?

A. Yes, sir.

151 Q. What do you do?

A. I draw my patches, where the pieces of the rail are badly broken, and it requires more iron in one place than in the other.

152. Q. Then you draw down the patch, so as to accommodate it to the condition of the iron you are to mend?

A. Yes, sir.

153. Q. Where are the rails delivered to you for mending—for working?

A. They are all delivered near the side of my shop, east or west.

154. Q. How far do you have to move them, to get them to your forge?

A. Some sixty or seventy feet, some not over ten feet.

155. Q. Is this moving of the rails at your expense?

A. Yes, sir.

156. Q. Where do you deliver the rails after being mended?

A. Right outside of my shop.

157. Q. If I understood you, you furnished your own tools under these contracts?

A. Yes, sir.

158. Q. What did these tools consist of?

A. Of "swages," "sledges," "tongs," "hammers," "two irons," our forges to build our fire on.

159. Q And, in addition to this, you furnished your own blast?

A. Yes, sir; either bellows or fan.

160. Q. How much less, if any, could you afford to mend iron per rail, provided the company furnished the tools?

A. Provided they furnished simply the tools?

1184 161. Q. Simply the tools; all the tools used in the shop and the blast.

A. Well, I don't know; it is something I have not estimated very closely.

162. Q. Get at it as near as you can, Mr. Lewis.

A. Well, perhaps a couple of cents a rail would pay the expense, perhaps it would not; I never have estimated that matter.

163. Q. Are your tools frequently broken in the course of the work?

A. I have some sledges in my shop that I have used for sixteen years; of course we have bad luck and break tools; sometimes there is a flaw in the swages, and they get broken.

164. Q. What weight of sledges did you use in mending rails—sledges and hammers?

A. My welding hammers, I think, would weigh about three pounds, while the sledges weigh from twelve to sixteen pounds.

165. Q. Do you use these heavy sledges on the common anvil?

A. Yes, sir.

166. Q. For what purpose?

A. For swaging, not for welding.

Cross-examination, by Mr. Curtis:

1. X Q. Prior to the consolidation of the roads in July, 1853, of which you have spoken, did you work for the company at mending rails?

A. Prior to the consolidation?

2. X Q. Yes, sir.

A. Yes, sir.

3. X Q. Did you then work by contract?

A. No, sir.

1185 4. X Q. When you worked for the company, not under contract, did you put more or less number of inches on to the rail than you do when working by contract?

A. Occasionally we did.

5. X Q. Was it the practice, when working for the company, to put more mend on to the rail than when you worked by contract?

A. At first our orders were to mend any rail we could mend in a day;

they thought that was too expensive, though I never worked a day on a rail. We used usually to get a less quantity to mend.

6. X Q. In working by contract is it not for the interest of the party doing the work to put as few inches on to the rail as he can get along with?

A. To a certain extent.

7. X Q. The more inches he mends the more time it takes, does it not?

A. To a certain extent. I can put eight or nine inches about as quick as I could put on six.

8. X Q. When you get above eight or nine inches, the more you put on the more it costs?

A. Yes, sir.

9. X Q. Then, is it not the interest of the one who mends by contract to put on no more than eight or nine inches of mend on a rail?

A. You have to mend what comes.

10. X Q. I asked you what your interest was. I didn't ask you what you did, but whether your interest to have mends not over nine or ten inches in length.

A. Yes, sir.

11. X Q. In mending fish-plate rails you used the patent block for four days; except that block you used no other at all?

A. I have always used a block.

12. X Q. I meant a patent block.

A. I never used any patent block, only four days.

1186 13. X Q. You speak of making an experiment when you mended thirty-five rails in a day; under what circumstances did you make that experiment; how did it come to be made, and where was it made?

A. It was made in my shop at Oneida, about two years ago. The way it was done was I had a man, a blacksmith, by the name of Matson, who claimed to be quite a rail-mender, who had worked at the business on the Rome and Watertown road; my impression was that he had not taken the first lessons in repairing rails, and I thought I could give him a good warming. I was short of a good blacksmith, and we worked

14. X Q. Where is that blacksmith now?

A. Mr. John Matson?

15. X Q. Yes, sir.

A. I could not tell you. The last I heard of him he was reported to be in Canada.

16. X Q. In stating the average amount of men per rail, the number of inches put on the rail, I observe you say "in your judgment." Now, did you make any measurement or take any account of the number of inches you did put on the rail?

A. My attention has never been called to the amount of mending, as I didn't work by the inch.

17. X Q. Mending as you did, you had no reason to take any account?

A. I have compared them. About a year ago, I saw a man who had been on some of those western roads; he was telling me he had charge of some shops on some western roads; they repaired by the foot. We got to talking about that, and we made a little estimate there about his rails, and he told me something about measuring the rails, and said it was very important to be careful in measuring, as it was often measured, all that was heated, instead of what was mended.

18. X Q. That was the only occasion where you ever made any estimate of the number of inches mended per rail?

1187 A. I think that is about the only time. I may have had a little

occasion with this Mr. Matson. He could not keep up with me, and thought I was selecting the rails, and we might have measured a little.

19. X Q. You have been in the habit of seeing rails mended besides your own. Have you any reason to think you put on any more inches per rail than others?

A. I think our iron was about the same as the middle division. The rails from the Rome bottom, where the ground was softer, might have been less.

20. X Q. Do you feel quite sure that you can mend twenty-one feet and one-third of rail in a day of not over ten hours?

A. Yes, sir.

21. X Q. A great number of witnesses have testified as to the amount of rails they have mended, on different roads, and the highest number of feet that any man has stated is twelve. Do you think you could mend nine and a third more than that?

A. My impression is I could.

22. X Q. But by actual measurement you could not say that you did?

A. No, I could not say positively. I only know how many rails I have mended in a day.

23. X Q. How much can you weld at a heat, and finish up at one heat?

A. We calculated generally to weld about four or five inches. I have welded in my fire seven to eight inches—good, clean weld.

24. X Q. You think you have to take four or five heats to the rail in mending?

A. It depends on the amount of labor to be done on it.

25. X Q. As a general thing?

A. No.

26. X Q. About how many heats to the rail did you make?

1188 A. We repaired a great many rails with two heats.

27. X Q. Sometimes when rails came in broken at such a length that it cannot conveniently be mended, you cut the end off?

A. What do you mean, shorten the length of the rail?

28. X Q. Yes, sir.

A. No, sir; not unless the track-master ordered it; we got twenty-five cents for that job.

29. X Q. That was only done under the special order of the track-master?

A. Yes, sir.

30. X Q. Did you cut a great many rails?

A. No, sir; we cut some where the flanges were all gone, but where we cut off one end and repaired the other end we charged for repairing also.

31. X Q. Who was the road-master or foreman under whom you worked; who had charge of the division where you were?

A. Mr. W. A. Evarts has been the road-master for a number of years.

32. X Q. Did you ever work for Mr. Thomas?

A. No, sir; William A. Evarts has been my road-master until about a year ago, perhaps a year and a half ago; I think it was in the fall, if I remember right; and since Mr. Evarts left the road, Geo. F. Angell.

H. LEWIS.

EBEN LEBART.

1. Q. What is your name, age, residence, and occupation?

A. Eben Lebart; residence, Little Falls, New York; occupation, blacksmith.

2. Q. How long have you been engaged in the business of blacksmith?

1189 A. Pretty much all my life; I went as an apprentice in the spring of my seventeenth year; now I am forty-seven.

3. Q. Where have you been engaged in your business?

A. The first five years I was an apprentice in Trenton Falls, town of Trenton; the balance of the time at Little Falls, with the exception of about two months.

4. Q. What has been the principal branch of the business in which you have been engaged?

A. For the last eighteen years railroad blacksmithing, repairing rails.

5. Q. For what company have you repaired rails?

A. The New York Central.

6. Q. Have you repaired them by contract or otherwise?

A. By contract.

7. Q. How much per rail has been your contract-price for the last ten or fifteen years?

A. Five shillings.

8. Q. Per rail or per foot?

A. Per rail.

9. Q. What division of the road has the rails you have mended principally come?

A. From Little Falls, Utica, to Amsterdam.

10. Q. What is the character of the road-bed on that division?

A. Through Little Falls it has a rocky bottom, and from Ft. Plain to Amsterdam it is a rocky bottom.

11. Q. What effect does a rocky bottom—a hard bed—have on the wear of the rails?

A. We claim that the rails broom up more on a rocky bottom.

12. Q. What appliances have you used for mending rails?

A. The first few years I used a common bellows; after a few years I got a fan.

13. Q. What other tools did you use?

1190 A. Sledges, hammers, cold-chisels, and a pair of tongs.

14. Q. What sort of an anvil?

A. Common grooved block.

15. Q. Of what dimensions?

A. I should think sixteen or eighteen inches square; it had a groove in the side where the rail would set.

16. Q. What was the form of the groove?

A. It was made to fit the side of the rail, the web part of the rail.

17 Q. For what did you use that?

A. It was for swaging down the side of the rail.

18. Q. What number of men did you work at one fire?

A. When I run a fire with a bellows I used three; after I got my fan I only used two—one a helper, one a foreman, I call it.

19. Q. Then when you used a common bellows, you used a blacksmith and two men besides?

A. Yes, sir.

20. Q. What was included in your contract, to be supplied by yourself?

A. Everything except the shell of the shop.

21. Q. Did you put in your own forge?

A. Yes, sir.

22. Q. Furnished your own tools?
A. Yes, sir.
23. Q. Then all that was furnished by the railroad company was the shell of the shop and the iron?
A. That was all, sir.
24. Q. What wages have you paid your men—employés—during the time?
A. Previous to the war I paid my foreman fourteen shillings, and from ten shillings to a dollar for the help; since that I have paid seventeen shillings, various prices, from seventeen shillings to eleven shillings, and ten shillings for the helpers.
1191 25. Q. How much for blacksmith?
A. My foreman generally didn't repair; I paid twenty shillings to my head repairer, and I had a repairer for seventeen shillings.
26. Q. State as near as you can what prices you have paid on the average since 1861?
A. For repairing rails?
27. Q. Yes, sir.
A. My average price would be seventeen shillings for the foreman and twelve shillings for the helper; that would be my best judgment.
28. Q. Do you work at the business yourself?
A. I did, sir.
29. Q. How long was you working yourself at the business?
A. Well, I first commenced between ten and twelve years ago. I work some at it now, but not so much as I did first.
30. Q. Are you still engaged in that business?
A. I am, sir.
31. Q. For what road?
A. New York Central—Hudson River now.
32. Q. Did the rails which you mended principally come from this division of the road which you refer to?
A. Yes, sir.
33. Q. What was the character of the rails which came to your shop to be mended?
A. We thought them pretty bad.
34. Q. Such as usually come from that road?
A. Yes, sir; delivered by the track-master.
35. Q. Where were the rails delivered to you?
A. Right at the shop—six or eight feet from the shop.
36. Q. How far were they moved to reach the forge?
A. About forty feet.
37. Q. Where did you deliver them?
1192 A. I delivered them about six or eight feet from the shop, so as to make a roadway between them and the shop.
38. Q. Was this moving them at your expense?
A. Yes, sir.
39. Q. Did you frequently have rails that had been mended sent back to be mended again?
A. Yes, sir.
40. Q. What amount of mending was required on these rails as they came to you?
A. During my mending rails I think I could say I put on as high as three to two and a half feet, so on down to six inches. I don't think less than six inches.
41. Q. What do you think would be a fair average mend done per rail in your contract?

A. I think I can safely say fifteen inches or thereabouts.

42. Q. How many rails per day upon an average did you mend in a day's work over one fire—what amount?

A. Sixteen, sir, is what I have done.

43. Q. And these were all mended upon the smooth anvil with swages?

A. Yes, sir.

44. Q. Did you ever try a patent block?

A. I had a thing, I don't know whether it was patented or not—the same thing Mr. Lewis had; it laid around there for two or three months, and I finally put it in the shop.

45. Q. Did you ever use it yourself?

A. I did, sir.

46. Q. With what success?

A. I did not like it on account of its being so unhandy and the time taken up in working with it, in getting the rail out of the jaws.

47. Q. What is the effect of such jaws upon the heated rail when placed in them to weld the patch?

1193 A. When you put it into these jaws—they are very heavy—and they have a tendency to chill the rail, the bottom portion of the tread.

48. Q. What effect does that have upon the welding of the rail?

A. In reality it don't have any effect, if you do the work quick enough.

49. Q. That is it. What effect does it have if you don't do it quick enough?

A. It would chill it.

50. Q. What would be the result of chilling it in that way?

A. It would make what we call a cold sheet—it would not be solid.

51. Q. Did you after this trial of the block reject it for your own use?

A. Yes, sir.

52. Q. Do you mend all forms of rails that are in use upon the New York Central Railroad?

A. Yes, sir; all except the steel rails.

53. Q. Please state what different forms of rails you have had to mend.

A. From the old T-rail to the five-inch fish-plate rail, what we call the Shanghai there; I don't know what you call it here.

54. Q. How long have you been mending fish-plate rails?

A. About three years.

55. Q. Can you mend fish-plate rails successfully upon this grooved block?

A. I did, sir.

56. Q. Is there any difference made by the company in mending?

A. In the price, sir?

57. Q. Yes.

A. No, sir.

1194 58. Q. All come in at the same price?

A. Yes, sir.

59. Q. Did you have frequent occasion to mend the fish-plate rails at the ends?

A. Yes, sir.

60. Q. How did you manage to secure the fitting of the fish-plates?

A. I take a rail and prepare it—for instance, this is the rail——

61. Q. The reporter has to put down your language; just describe in words your way of doing.

A. I cut out the tread of the rail to about the proper thickness, then

I put on the patch and weld it, using light hammers, lay it over and swage it down.

62. Q. Is there any difficulty in mending in that way?

A. No, sir.

63. Q. Is there any difficulty in getting the bolts to fit?

A. No, sir. I know on one occasion I had to cut out the rail.

64. Q. Do you ever damage or close up the holes wholly or in part?

A. No, sir; they use a $\frac{3}{4}$ bolt, and the holes are about $\frac{7}{8}$.

65. Q. What do you do if anything of that kind happens?

A. I would drive in a punch.

66. Q. Is there any difficulty in doing anything of that sort when the rails are heated?

A. No, sir.

67. Q. You have operated two fires for mending rails most of the time?

A. Most of the time, but have not mended many fish-plate rails.

68. Q. What proportion of the rails that have come to your shop to be repaired have been fish-plate rails?

1195 A. A small portion, sir; I cannot say exactly.

69. Q. What proportion of your road is laid, in that division, with fish-plate rails?

A. I don't know of any except a small portion near St. Johnsville, and a few that I have had that came from Mr. Lewis' division.

70. Q. Is that all the iron that you have mended except the common T-rail?

A. Yes, sir.

71. Q. Do you scarf the rail any?

A. I used to scarf the piece, then weld and swage it down.

72. Q. Suppose a rail comes to your shop to be repaired which is badly battered at the end and splintered; what would you do with it before putting on the patch?

A. You mean broomed up?

73. Q. Yes.

A. We take it and put into the fire and heat it, and fit on the pieces as near as we can to the place, and get on a welding heat and put on the patch.

74. Q. How large a patch can you weld on as one patch upon the common anvil?

A. In length, you mean?

75. Q. Yes.

A. If necessary I could put on ten feet; that is, a piece at a time.

76. Q. All in one piece?

A. I would first cut my piece whatever length necessary and weld as I go along.

77. Q. How much welding do you do at a single heat?

A. I have often put on between five and six inches.

78. Q. What is the most you have put on one rail?

A. The patch on it?

79. Q. Yes.

A. Five feet two inches; I measured it.

1196 80. Q. On one end?

A. From the center to one end and back, five feet two inches.

81. Q. About how much coal do you consume at one fire per day?

A. I should think between two hundred and fifty to three hundred pounds.

82. Q. What has been the average cost of your coal for the last ten or fifteen years?

A. About six dollars.

83. Q. What kind of coal have you used?

A. The common Blossburg, soft coal.

84. Q. Have the rails mended at your shop given satisfaction to the railroad company?

A. I never heard any complaint, sir.

85. Q. Are they inspected before they are accepted?

A. Yes, sir; by the track-master.

86. Q. Have you had rails come back to the shop to be remended after you had mended them once?

A. Yes, sir.

87. Q. In the same place or in other places?

A. In other places.

88. Q. How have your rails worn, the part mended?

A. They have worn well, so far as I know.

89. Q. Has your contract with the railroad been profitable, sir?

A. I have made a comfortable living at it.

90. Q. Anything more than that?

A. I have made a good living, I would say.

91. Q. Is that your only business?

A. Yes, sir.

92. Q. About what would be the average earnings of one fire under your contract per day?

A. We calculated one fire would do ten dollars a day.

1197 By Mr. Curtis:

Q. Gross or net?

A. Gross.

93. Q. I will ask you if this has been the result of your experience in mending rails that each fire has realized that amount?

A. No; not that each fire has done that, but I have always done it myself, but the other fire did not, because I could not get a man that would work as fast as I would myself.

94. Q. The extra fire has been profitable?

A. It paid me, sir; at least has not run behind any.

96. Q. Judging from your experience in rail-mending, I will ask you if, in your judgment, rails can be well and successfully mended, such rails as you have had to mend, upon the common grooved anvil block?

A. The common grooved anvil block?

96. Q. Yes.

A. All the rails I mended I could mend successfully.

97. Q. From your observation of the working of the jaw and clamps, in the machine you used, do you or not regard it as any advantage?

A. I do not; as I said before, it takes too much time to work it, and it is large and awkward, and takes too much time to get the rail in and out.

98. Q. What amount of mending of rails in feet have you been able to make, as an average, with the appliances used in your shop?

A. Fifteen inches to the rail would be twenty feet.

99. Q. Have you any doubt of your ability to do that amount of mending per day with one fire, upon the common anvil?

A. I think I can do more, myself.

100. Q. What number of hours do you count as a day's work?

A. Ten hours, sir.

1198 101. Q. What amount of mending, either in rails or feet, as you please, has been accomplished at the other fire which you did not work yourself?

A. I had one man would do the same as I did; I demanded that amount, but I have not seen any other that would do it.

102. Q. What amount did it average?

A. From twelve to fourteen rails.

103. Q. The same general character of rails?

A. Yes, sir.

104. Q. Taking the rails as they came from the road?

A. Yes, sir.

105. Q. What is the most important matter in connection with rail-mending, in order to secure a good job?

A. A good clean heat, sir.

106. Q. State what you mean by that.

A. I mean a good heavy heat, which will be soft, and when struck will draw together and weld.

107. Q. Is there any experience needed to do that successfully?

A. Yes, sir.

108. Q. Would it make any difference whether the iron was mended on the common block or in jaws, in respect to the skill required?

A. No, sir. You would have to have a clean heat either way to make a good job.

109. Q. What dimensions of iron have you generally used in mending rails?

A. Two and a half inches by one-half inch, and two inch by one-half inch.

110. Q. Upon what does the width of the iron depend that you use in patching?

A. We have always used two and a half by one-half.

111. Q. Where do you use the two inch by one-half?

1199 A. Where we had small rails to be mended.

112. Q. The width of the iron, then, would depend upon the width to be mended?

A. Not so much as upon the amount of material required.

113. Q. Have you had different treads to mend?

A. Yes, we have, but we used the same kind of iron all round.

114. Q. Was there any waste of the iron used in patching?

A. Nothing more than the natural waste by heating—scaling off, merely.

115. Q. That would be the same in either case—either way of mending?

A. Yes, sir.

116. Q. Did you ever have to chip off any of the rail?

A. I did on the five-inch fish-plate rail.

117. Q. Why did you chip off?

A. It would not let the plate up, and I chipped off a little.

118. Q. Was there any difficulty in doing that?

A. No, sir.

119. Q. What would be the waste of that?

A. None, to amount to anything.

120. Q. I will ask you why you had to do that?

A. I tried the plate, and if it did not fit, I cut off some of the iron.

121. Q. Did you do that whilst the iron was hot?

A. I aimed to do so.

122. Q. How much would this wastage from chipping amount to?

A. I don't think it was a quarter of a pound.

123. Q. What would be done with it?

A. It would be thrown among the scraps—we threw it out.

1200 124. Q. It was utilized, was it?

A. They used it. I think they worked it up at Albany.

125. Q. Have you had frequently to mend at both ends and in the middle?

A. Yes, sir. Have both ends and in the middle—we had last Friday. I think my man got out twenty-three rails of the common twenty-one foot rail, low iron of the Troy and Schenectady division. Saturday night I counted up the rails, and there was forty-four rails, and twelve of the forty-four were at both ends.

126. Q. Twelve of the forty-four rails were mended at both ends?

A. Yes, sir; twelve.

127. Q. Have you had any experience in mending iron that came from other roads?

A. Yes, sir. I was speaking of this last; that did not come off from the main line.

128. Q Is that division one with a heavy traffic?

A. No, sir. In comparison with the main line it has a very light traffic.

129. Q. Is the damage to the rails, in comparison with the New York Central, less or more?

A. It is less.

130. Q. How long has the block, with the jaws and clamps you have spoken of, been in your shop?

A. About three years.

131. Q. Has it been used in that time?

A. Yes, sir.

132. Q. To what extent?

A. I have a man that, on this five-inch rail, does better with it.

133. Q. The five-inch fish-plate?

A. Yes, sir.

1201 134. Q. In mending with these jaws and clamps, do you use any less iron than you do in mending with the common anvil?

A. No, sir; the same kind and the same thickness.

135. Q. What is your judgment as to whether this man in your employ—that you have spoken of as using the clamps—can work faster with it than on the common anvil?

A. I don't think he can get along quite as fast as he can without; still, he can get along, being what we call a green man—incompetent. I don't do as well with it as I do without it.

136. Q. What do you attribute the difference to?

A. The time it takes to open and shut it—to operate the block.

137. Q. At how much less could you afford to mend iron if the company furnished the blast and the tools?

A. I should not want to do it any less if I could help it; perhaps I could a little; I think perhaps I would take the sixty cents rather than not have it.

138. Q. If they would furnish these appliances?

A. Yes, sir.

139. Q. How heavy hammers do you use for welding-hammers?

A. About three pounds; two and a half or three pounds.

140. Q. Do you use heavy sledges?

A. Not heavier than twelve or fourteen pounds.

141. Q. Do you use sledges in making welds?

A. No, sir; we use light hammers for that.

142. Q When do you use the sledges?

A. When we go to swage it down.

143. Q. About what is the weight per foot of the iron that you use for mending rails?

A. About not far from four pounds to the foot, I should judge.

144. Q. Do you know what it has cost, say, for the last ten
1202 years?

A. I do not.

145. Q. You don't know, then, the expense of the iron to the company?

A. I don't know, sir.

146. Q. This extra man that you have mending for you only uses these clamps for mending fish-plate rails?

A. That is all.

Cross examination by Mr. Curtis:

1. X Q. I understand you to be mending iron at the present for the company, under contract?

A. Yes, sir.

2. X Q. Is the work being done recently in your shop about the same in its character as what you have done for some time past?

A. No, sir; it is less injured; is not so bad iron to mend.

3. X Q. Did you ever, by actual measurement, mend thirty feet in a day; if so, when, and who made the measurement—thirty feet at one fire?

A. Well, I never measured only this way: that frequently I had heavy mends, and would measure the heaviest mends myself—if I would have a longer mend, five feet, three feet, or two and a half, I would set them down.

4. X Q. Are you ready to swear that you mended thirty feet a day?

A. Twenty feet, I said.

5. X Q. Are you ready to swear that you mended twenty feet in one day—what you did yourself?

A. I could not state positively.

6. X Q. You had no occasion to keep a record of the number of inches which you mended?

A. No, sir.

7. X Q. And have not done so?

A. No, sir.

1203 8. X Q. Why did you have your man use this block in order to mend fish-plate rails?

A. I have him use it because I think he can do a little better work, but not so fast.

9. X Q. You think you never put on less than five or six inches at a mend?

A. I don't know of less than five inches.

10. X Q. Don't you think you do now, sometimes?

A. We do now, but I have not mended any lately myself.

11. X Q. Have you ever measured a lot of rails to see how many inches they average per rail mended?

A. Yes, sir; I did it last Saturday.

12. X Q. Well, how did that measurement result?

A. I made up my mind they would turn out about six inches to the rail; there were three of those rails measured; one twelve inches and

one eleven inches. I don't recollect as I measured more than one of twelve. The way it was, a gentleman came there who was talking about the matter, and so we measured these rails.

13. X Q. An average of six inches per rail would be one dollar and twenty-five cents per foot, would it not?

A. Our work is not done by the foot.

14. X Q. Yes, sir; if you mend six inches to the rail, at sixty-two and a half cents per rail, you would get one dollar and twenty-five cents per foot.

A. We never calculated it in that way.

15. X Q. But when you mend six inches to the rail on an average, you are getting pay at the rate of one dollar and twenty-five cents per foot.

A. We don't get pay by the foot.

16. X Q. I know you are paid by the rail, but you are paid at such a rate as amounts to one dollar and twenty-five cents per foot, does it not?

A. If you figure it that way. I never reckoned it in that way.

1204 17. X Q. You never kept an accurate account from which you could calculate the cost of mending to your company, to the fire?

A. I knew the amount per month of coal.

18. X Q. You used about twelve tons a month?

A. Yes, sir.

19. X Q. That includes the engine, three fires?

A. Yes, sir; two fires the whole time, and one fire occasionally.

20. X Q. What proportion of the coal do you use at your fires, and what by the engine?

A. I think I use more to the engine than the fires; still I never figured closely.

21. X Q. How much did you ever use the patent block yourself?

A. Not but a little; but a day or so.

22. X Q. Was it the same sort of block just described by Mr. Lewis?

A. The same kind he used.

23. X Q. These rails you measured last Saturday are the only lot of rails you measured to see how much you put on the rail?

A. The only lot from this road.

24. X Q. Did you ever measure any lot of rails mended from any part of the road, except what you measured last Saturday?

A. I never measured all of those.

25. X Q. Did the gentleman who was there measure them all?

A. I don't know; I could not say.

Redirect examination by Mr. Jewett:

Q. Does it cost more proportionately to put on a patch of nine or ten inches as against one only five or six inches?

1205 A. No, sir; because I can mend six inches as quick as I can mend three.

Q. How long a patch can you put on with one heat upon your common anvil?

A. I think I can mend six inches.

Q. How many heats would you require for eight or nine inches?

A. I think I could mend it in two heats.

Q. Would it cost more in proportion to mend a patch eight or nine inches long than one six inches long?

A. I don't think it would.

Q. How does the iron from the Troy and Schenectady Railroad compare in the amount of damage done to it by the traffic on the road?

A. It would be much better, not so much damaged.

Q. Have you any doubt as to your ability, whilst in the business of mending iron, to mend as much per day as you state in your direct examination?

A. I have not. I think I can do all I have said, that is, when I done it myself.

Q. Are the rails which you are now mending as much damaged; do they require as long patches as formerly?

A. As I stated before, they are not as bad as on the main line; don't require as long a patch.

Q. Do the rails that come to the shop require as much mending as they did five or ten years ago?

A. No, sir; because they have a surplus of iron, and don't leave it on the road so long.

Recross-examination by Mr. Curtis:

Q. Did you, or not, figure up with a gentleman to see about how many feet you ever did mend in a day?

1206 A. I don't recollect whether I did or not. I think we made some figures—made an estimate on fifteen inches to the rail, and the number.

Q. Didn't he tell you that would come to twenty-eight feet, and didn't you say that you never mended as much as that; that you might have mended as much as ten feet in a day?

A. I never did.

Q. Did you not have some conversation of that kind?

A. I had some conversation. He talked about mending twenty-two inches at a heat, and I thought that was a tremendous high estimate. I did not recollect of such a conversation. We talked about what the average was. I think he told me he mended twenty-two inches at a heat.

Q. Did he tell you what block he used?

A. I don't know how he did it. I did not ask him, and could not tell at all.

Q. Have you ever mended rails anywhere except at Little Falls?

A. No, sir.

E. LEBART.

DAVID S. DAVIS.

1. Q. Please state your name, age, residence, and occupation.

A. David S. Davis; reside in Boston; occupation, blacksmith.

2. Q. How long have you been engaged in the blacksmithing business?

A. Since I was fifteen years old; about thirty-five years.

3. Q. Have you, during any portion of that time, been engaged in mending rails—railroad rails?

A. I have.

4. Q. Upon what road?

A. It is now the Old Colony Road; it has had several names.

5. Q. Where does the road run from and to?

1207 A. From Boston to Newport, Hyannis, Plymouth also.

6. Q. How long have you been engaged in that business of mending railroad bars?

A. Twenty-one years, I think.

7. Q. Have you, during the whole or any portion of that time, had charge of that branch of the business of the railroad company?

A. All of that time; I would not say that I mended rails all of that time; there has been times when we have not done anything at the business.

8. Q. But when the railroad company mended bars you had charge of it?

A. Yes, sir.

9. Q. Where were your shops located at the time you did this mending?

A. In Boston and at South Braintree.

10. Q. Have you mended by contract; or has the railroad company furnished the help and material, and done the work on its own account?

A. They have; it has all been day-work.

11. Q. Never by contract?

A. No, sir.

12. Q. How many fires for rail-mending purposes have been in use by that company?

A. One at the start; we have got four at the present time.

13. Q. Did you use a common blast or furnace for this purpose?

A. We used a blast and furnace, and hard coal, anthracite coal.

14. Q. Have you always used this kind of fuel and blast?

A. We have; the first two or three rails I mended in a common fire for an experiment, not more than half a dozen.

15. Q. How many men have you at one fire for this purpose?

A. Three.

1208 16. Q. What do you call them?

A. Two helpers and a blacksmith.

17. Q. About what have been the wages of your laborers and blacksmith? State the price as near as you can, at different times since you have been mending rails.

A. In 1858 we paid a dollar seventy-five cents for the blacksmith and a dollar a day for helpers; at the present time it is one dollar and seventy-five cents to the helpers and two dollars and seventy-five cents to the blacksmith.

18. Q. About what would you judge to have been the average wages of helpers and blacksmith for the past ten or twelve years, or since the war commenced?

A. About one dollar and a half for helpers and two dollars and a half for the blacksmith I should think was the average for that kind of work.

19. Q. About how much coal per day would be consumed at one fire?

A. Three hundred pounds.

20. Q. About what has been the cost of coal for one fire?

A. Well, it cost at that time seven dollars.

21. Q. A ton, you mean?

A. Yes, twenty hundred to the ton; now we buy it by the cargo; I don't think it varies a great ways from that; I don't know.

22. Q. So that the fuel has cost about one-sixth of seven dollars per day for a fire?

A. Yes, sir.

23. Q. What has been the character of the iron in use upon the Old Colony Railroad since you have been connected with it?

A. Mostly English refined iron.

24. Q. What patterns of rails have been in use upon the road?

A. The common T-rail, three and one-half inch; we are now using a four-inch rail.

1209 25. Q. Have you at any time mended what is called the fish-plate rail?

A. I call them all the fish-plate rail, the common T-rail.

26. Q. Have you always, during all this time you have been mending rails, had in use upon that road the fish-plate rail?

A. Always; no other rail, to my knowledge. I know we had no other.

27. Q. What was the quality of the iron used in these rails as compared with others? Was it good or bad?

A. We have had different qualities; the majority has been poor; our old pattern was very good iron; different grades.

28. Q. Is there or not any difference in the wear of iron on railroad tracks, owing to the different quality of the iron of which the rail is composed?

A. That makes the difference; the quality of the iron.

29. Q. In comparing the bad iron with the better qualities, what would be the difference in the amount of mending to be done on it?

A. We have some qualities that break to pieces; ore loose; would break off; split down.

30. Q. Was there or not much of that kind of iron on the road?

A. There was at one time; so much so that we stopped mending; it would not pay.

31. Q. What kind of machinery have you used in mending railroad iron?

A. I used—we commenced with a block; I could not tell you the name of it; it is a plain block, whole, with a movable die; I should judge about two and a half feet one way, I guess about twenty inches the other.

32. Q. With groove in it?

A. No grooves; a die that we put in the hole cast in the block the shape of the die.

1210 33. Q. What was the use of this die?

A. That die was used as a former for the side of the rail.

34. Q. What block do you use for the purpose of welding the patch onto the side of the rail?

A. We used this block when we first commenced; after using that, I don't know how long exactly, then there came another block; what they called this anvil, a jaw-anvil, and they ordered——

35. Q. Look at this block on the table. (Beebe & Smith's exhibit.)

A. This is the same thing, except the grooves run straight across the anvil instead of diagonal.

36. Q. About when did this block with movable jaws come into the shop?

A. I think in September, 1858.

37. Q. Did you, during any of this time, work yourself at the business of mending rails?

A. I did.

38. Q. How long did you personally employ yourself at the business?

A. Only just long enough so that I could break in some one else to do the business.

39. Q. Did you try this block with movable jaws in the first place?

A. I think I did.

40. Q. You had been mending rails for some years prior to the time you commenced to use this block?

A. Yes, sir.

41. Q. How long an experiment or trial of this block did you make—of these movable jaws?

A. Well, as near as I can get at it, about three years and a half that we used it in the shop.

42. Q. Commencing with the year 1858?
A. Yes, sir.
43. Q. Did you then stop using it?
1211 A. I think there was about four years we didn't use it all; then we changed our president, and he concluded to revive it and go on mending.
44. Q. When you commenced mending again what sort of an anvil did you use?
A. We used this.
45. Q. Which do you mean; is that the same? (Referring to Exhibit Smith & Beebe.)
A. Yes, sir.
46. Q. How long ago was this; about how long?
A. Seven years ago.
47. Q. Did you use it exclusively?
A. Yes, sir.
48. Q. How long did you use it?
A. I could not say.
49. Q. About how long?
A. Two years.
50. Q. Did you abandon it?
A. Yes, sir.
51. Q. And what did you return to?
A. The common block.
52. Q. In the use of the common block to which you have referred, is there any support given to the sides of the rail while mending on the patch?
A. Not any.
53. Q. It was a smooth anvil surface that you mended upon?
A. Yes, sir.
54. Q. About what, on the average, as near as you can calculate or remember, was the extent of the mending, per rail, done in the shops of which you had charge?
A. I calculated eighteen feet a day of ten hours.
55. Q. What was the number of hours which constituted a day's work in your shops?
A. Ten hours.
1212 56. Q. Then, if I understand you, the amount of mending in one day's work with one fire was about eighteen feet?
A. Yes, sir.
57. Q. Can you state the range in feet and inches of your mending, per rail?
A. That is what I made up my mind to, by an average; I arrived at that conclusion.
58. Q. What was the least and what was the highest?
A. Perhaps the least would not be any more than three inches, and I put on four feet at a time.
59. Q. Do you mend rails frequently at both ends and in the middle?
A. Yes; a large majority of the rails we mend at both ends.
60. Q. Taking the rails as they came into your shop, what was the amount in feet and inches to the rail that you mended?
A. Two feet to the rail.
61. Q. Do you mend as much per rail now as formerly?
A. No; we don't patch so many; we mend rails differently.
62. Q. State how you are mending a large portion of your rails at the present time.

A. We draw them up with the tools, take a heat without putting any iron to them.

63. Q. Reducing the rail somewhat?

A. It reduces them somewhat; they use them for side-tracks, gravel-tracks, and all that.

64. Q. How long have you been mending rails in that way?

A. Ever since the last time we started, six or seven years ago.

65. Q. Who operated the machine with movable jaws, that you have referred to?

A. The helpers.

66. Q. Did you or not, whilst using that, keep the same number of men at a fire?

A. We did.

1213 67. Q. Did you notice the operation of that machine for that purpose?

A. I did.

68. Q. Were you frequently in the shop to notice it?

A. I was within twenty feet of it, at work at a fire at that time.

By Mr. Curtis:

Q. I understand you to say that you commenced mending rails on the smooth anvil?

A. Yes, sir.

Q. And mended six rails?

A. The six rails I mended for an experiment, to see if we could mend them.

By Mr. Jewett:

70. Q. After that what anvil did you use?

A. We went to this plain block, with a furnace and a hard-coal fire.

71. Q. This plain block, as I understand it, had a die which set into a hole in the block, and that die fitted the side of the rail, and was used in finishing up the sides of the rail?

A. Yes, sir.

72. Q. You used this until the anvil represented by this model came into your shop, in 1858, or about that time?

A. Yes, sir.

73. Q. Now, as I understand you, you noticed this Beebe & Smith machine whilst it was in use?

A. Yes, sir.

74. Q. What, in your judgment, was the value of that machine as compared with the smooth anvil-block that you had before used?

A. I find by that block it makes a smoother job to look at, but is not a safe block to work on in regard to your heats. If you get a certain class of men, good, trusty men, that get good heats every time,

1214 and get them broke into it, they are pretty sure to get a good heat and weld so as to have it stay; but as a general thing they are pret'y slow motion, and don't get the rail into the jaws before you lose the heat.

75. Q. What is the effect of bringing the rail in contact with such masses of cold iron?

A. It gets them too cold, but that don't affect the heat; where you get the rail in there in time before you lose the heat, it will hold tight; but there is this uncertainty about it, it is not always reliable.

76. Q. What is most material in welding the iron to produce a safe and sound weld?

A. A good heat; that is the trouble with our rails, they are not

welded up good when they are rolled out; not good heats taken on them.

77. Q. That is the difficulty with this class of rails you spoke of?

A. Yes, sir.

78. Q. What is the consequence of having an imperfect weld upon the rail which you have attempted to patch?

A. As soon as you begin to run over it, it will draw off a little and break off.

79. Q. Have you ever had any difficulty in general in procuring a solid and safe weld when using the common anvil?

A. There may be some times that a man may be deceived and the pieces would come off, with either block, but very seldom; a man don't have a chance to cover up his faults as in the jaws.

80. Q. I asked you, as a practical man, whether you found any difficulty in making good work in using the common anvil?

A. Not at all.

81. Q. Do you find any difficulty in procuring men to do good work on the common anvil?

A. Not at all. I have a man who does good work, and likes it best.

82. Q. Do you mend this fish-plate iron in your shop?

1215 A. We do, altogether.

83. Q. What are the dimensions of the iron you use for mending?

A. We used 3½.

84. Q. You don't understand my question; what is the dimension of the patch, the piece of iron you put on the rail?

A. Two and a quarter by one-half inch, and two and a half inch by one-half inch, some three-eighths.

85. Q. What does the thickness of the iron which you put on depend upon?

A. That is owing to the amount broken down.

86. Q. To the amount of the wastage of the iron?

A. Yes, sir; we commonly chip off some.

87. Q. How long a patch can you weld on and finish up upon the common anvil at one heat?

A. Six inches.

88. Q. In mending rails, which part of the operation is it that requires the most time?

A. I don't know as there is much difference between the heating and the finishing off; pretty much the same.

89. Q. Is not a considerable portion of the time in mending consumed in heating the rail?

A. I don't think there is much difference.

90. Q. Does it make any difference whether you use the common anvil, or mend with the one with movable jaws, as to the heating?

A. I don't think it does make any difference.

91. Q. It takes just as long to heat the iron if you mend with the movable jaws as on the common anvil?

A. Yes, sir.

92. Q. Have you ever made any estimate of the expense to the company of the mending of railroad-bars, under your charge?

A. I have—at that time, about 1858; that was at the time this block came.

1216 93. Q. Did this estimate include the iron only, or all the material you used?

A. It included the iron, labor, and coal.

94. Q. About what was the expense per foot, or inch, as you estimated it, either way?

A. Forty-two and a half cents per foot.

95. Q. What did that include?

A. Iron, coal, and labor.

96. Q. It did not include any estimate for the wear and tear of tools?

A. No, sir.

97. Q. After the introduction of that machine with movable jaws, whilst it was being used was the expense reduced, or did it remain about the same?

A. I could see no difference in the amount got out.

98. Q. In the mending of railroad-iron upon the smooth anvil how do you usually prepare the damaged iron for receiving the patch?

A. Well, with the block we would scarf the patch and weld it on without chipping off the rail, chipping it off from the outside, the surplus; and with the plain block we chip off, before we put the patch on, a sufficient quantity to receive the patch; cut off all the loose iron, and put it on with light hammers.

99. Q. On which form of block, in your judgment, could you do the most work per day?

A. As I have said before, I don't see any difference.

100. Q. State what objections, if any, in your judgment, there is to the use of the block with movable jaws, for mending rails?

A. Yes, sir; this continual complaint of pieces coming off, and my man at Braintree was never satisfied with these blocks; would rather have the smooth block that he had been accustomed to work on; but still we continued with that block until, I could not tell you how long ago, there was a man came around and said to him he must stop
1217 mending rails on that block, or pay him thirty cents a foot. He reported to me, and said he took the block and threw it right out in his presence; then I furnished him a plain block, and he has been mending right along since.

101. Q. Has he mended as much iron, as many feet and inches, since that change?

A. Yes, sir.

102. Q. Has it lasted as well on the road since?

A. I have not heard any complaint since.

103. Q. Which form of block would you yourself prefer to use if mending rails for yourself by contract with the road?

A. If I was going to mend them myself, making all the heats, it would make a difference; or if you have to get hired men and take all the chances, the plain block is to be preferred.

104. Q. If you were operating the railroad yourself, which would you prefer?

A. The plain block.

105. Q. Please state the reasons.

A. As I have said before, the patches coming off, it requires more expert men to do the work with the jaws than with the plain anvil—these helpers particularly, and the blacksmith as regards the heats.

106. Q. Were you or not in one or the other of your shops mending railroad-bars on the plain block at the same time the block with jaws was in use?

A. I think we mended on the plain block at one fire.

107. Q. Was there any perceptible difference in the amount of iron mended at each of the fires in the same shop?

A. I could not see that there was.

108. Q. Was there any difference in the amount of iron used for patches for rails?

A. I don't think it would vary much.

109. Q. You have spoken of chipping out and cutting off from the rail, making a sort of scrap iron. Was this saved and utilized by the railroad company?

1218 A. It was sold for scraps.

110. Q. So that all the iron that came off was actually of some value, was it?

A. Yes, sir.

111. Q. As rails have recently come to the shop to be mended, have you or not been able to mend more rails than formerly?

A. I think we have.

112. Q. What is that owing to?

A. It is owing to the manner of doing the work. We have stopped patching rails so much.

113. Q. Do you patch any rails now?

A. Yes, sir.

114. Q. How does the extent of damage to the rails now compare with the extent of damage to the rails brought to the shop years ago?

A. It is a different quality of rails.

115. Q. Are the rails coming to the shop in about the same condition?

A. About the same.

116. Q. How many rails do you patch to the day at one fire now?

A. I cannot tell the amount of rails.

117. Q. When you were patching exclusively, how many rails were you mending in a day?

A. We never patched exclusively since we started the last time.

118. Q. Go back to the time when you did.

A. About nine rails a day.

119. Q. What would the number of rails which you would mend in a day depend on?

A. On the length of the broken parts.

120. Q. You could mend more rails that required a patch of six n ches than you could with a patch of eight inches?

A. We could.

1219 121. Q. In stating the number of rails mended per day, have you stated the average number, as near as your judgment has en abled you to do?

A. I have.

122. Q. Do you recollect of having made any estimates of the number of rails mended, and the amount of mend per rail, at the time you were doing this mending—as to the number of rails and amount of mending you did?

A. We did the number of rails. I never kept the length of the patches put on.

123. Q. Do you remember of having calculated it, so as to form an opinion at the time?

A. I wanted to come at the cost—wanted to see how it paid—whether it would pay, before we would go at it.

124. Q. That was at the time when you introduced the jaw-block into the shops?

A. Yes, sir.

125. Q. Was that estimate made at that time?

A. That estimate was made from memory, according to the best of

my judgment, of the length we used, of the amount. The number of rails I knew to be about that.

126. Q. Do you now remember that the average amount per day of rails and feet was a judgment formed by you at the time you were doing the work?

A. Yes, sir.

Cross-examination by Mr. Curtis:

1. X Q. You were in the shop at Boston, were you not, Mr. Davis?

A. Yes, sir.

2. X Q. Always have been so?

A. Yes, sir.

1220 3. X Q. Have you ever been called upon to testify before in regard to this matter, in the case of any infringements of the patents of this kind?

A. I know I gave my testimony. In regard to what, I could not state what the evidence called for.

4. X Q. Where and when?

A. I think as much as eight years ago. I could not state what place nor about what time it was. I know I gave my deposition.

5. X Q. Who took your deposition? Do you know?

A. No; I could not tell you.

6. X Q. Do you remember of at any time seeing, in Boston, and having a conversation with him, Mr. Turrill, the gentleman who sits here, in regard to the work of these machines?

A. I do not. I don't know as I ever saw him before.

7. X Q. Do you recollect of having such a conversation with anybody?

8. X Q. Do you recollect any conversation with any man in which you talked about rail-mending and working with these machines, and the two different machines?

A. No, sir; I do not.

9. X Q. Are you quite sure that you cannot recollect such an interview, somewhere about 1867, or earlier than that, in 1860 or 1862?

A. I think it was in 1858 we got the block.

10. X Q. And in 1860 or 1862, after you had got the Beebe and Smith block, didn't you have such an interview?

A. I don't remember.

11. X Q. Did you ever hear anything about your road being sued in 1868 for an infringement of patent of a jaw-block?

A. No, sir.

12. X Q. Never heard anything said about it?

A. Not a word.

13. X Q. Can you swear now that you discarded the use of the Beebe and Smith machine and went to mending on the common anvil prior to the spring or summer of 1868?

A. No, sir.

1221 14. X Q. You think you continued down to that period to use the Beebe and Smith machine?

A. Yes, sir; prior to 1868.

15. X Q. My question is, can you swear now that you stopped using the Beebe and Smith machine and went to mending on the common anvil prior to 1868?

A. I think we didn't use it until the fall of 1868.

16 X. Q. 1858 is your statement?

A. Yes, 1858; I cannot state the year that that block was thrown out.

17. X Q. You speak of mending fish-plate rails; do you know whether

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A. Yes, 1858; I cannot state the year that that block was thrown out.

17. X Q. You speak of mending fish-plate rails; do you know whether

the rails used on your road are what is known as the common fish-plate rail, or is it what was called the Howe fish-plate with a piece of wood on one side of the iron ?

A. Yes, we used that for a short time.

18. X Q. What have you used since then ?

A. The fish-plate.

19. X Q. What is the shape of the rail ; how does it compare with the common T-rail ?

A. It is a common T-rail with a little different form, but about the same shape. We have a new pattern now, a new pattern of the fish-plate.

20. X Q. You used three of those patent machines at Braintree ?

A. I think there was.

21. X Q. You had one in the shop at Boston ?

A. We had.

22. X Q. Only one machine ?

A. I think not ; didn't have but one machine ; I think we used two fires ; I think we used a plain block at one fire.

23. X Q. Was one of the fires in Boston used for doing other work than mending rails ?

A. No, sir.

24. X Q. You say that you can weld six inches at one heat on the common anvil ?

A. I do.

1222 25. X. Q. How much can you weld on the machine with a movable jaw ?

A. About the same.

26. X Q. Do you think a good workman cannot mend more than six inches with a jaw-block at one heat ?

A. No, sir ; not and work it off as it ought to be.

27. X Q. The only actual calculation you ever made, that you now remember, was the calculation made at the time you went to work on the Beebe & Smith machine, which you say was in 1858 ?

A. Yes, sir, all ; and that was a calculation of the number of rails per day.

28. X Q. Did you make a measurement of the number of inches per day ?

A. Well, I calculated about the number of inches on an average of the number of rails.

29. X Q. Why did you calculate the number of inches; why was it you wanted to know the number of inches per rail ?

A. Because we wanted to get at the cost.

30. X Q. You say it cost forty-two and a half cents per rail ?

A. Forty-two and a half cents a foot.

31 X. Q Then it cost eighty-four cents a rail ?

A. Yes, sir.

32. X Q. You have made no such calculation on an actual estimate upon facts since you discarded the use of the Beebe & Smith machine and went to work on the common anvil ?

A. No, sir.

33. X Q. As I understand it, you made an experiment to find out whether it would pay to use this block over the common anvil, and you proceeded after that to use a block having a movable jaw ?

A. Yes, sir.

34. X Q. You then began to use the machine known as the Beebe & Smith machine ?

A. Yes, sir.

1223 35. X Q. And up to that period at which you speak of a man coming to your man and saying he must pay thirty cents a foot, you then threw it out?

A. Yes, sir.

36. X Q. Since that time what proportion of rails have you welded without patching, and what proportion have you patched?

A. I think about one-third were welded up without patching, and about two-thirds patched.

37. X Q. I want you to reflect a little, and make sure whether you do or do not recollect of a person coming to talk with you on the subject after 1861.

A. That was in war times.

38. X Q. That was about the beginning of the war.

A. No, sir; I cannot remember of any conversation with any man about that block since that time.

39. X Q. You have no recollection of seeing a man named Crosby on the subject—a man living in Boston?

A. No.

40. X Q. When it cost you forty-two and a half cents a foot, what wages were you paying to the blacksmiths and helpers?

A. A dollar a day to the helpers and one dollar seventy-five cents a day to the blacksmith.

41. X Q. Who has charge of the shop at Braintree?

A. Sanborn is looking over it at the present time.

42. X Q. How long has Sanborn been in charge of it?

A. About seven years.

43. X Q. And who was there before him?

A. No one; it was a new shop when he went there.

DAVID S. DAVIS.

DANIEL L. HARRIS.

1. Q. Please state your name, age, residence, and occupation.

1224 A. Daniel L. Harris; residence, Springfield, Mass.; age, 43. I commenced life as a civil engineer. Since 1843 I have been engaged very largely in building bridges and railroads, and since 1855 I have been president of the Connecticut River Railroad.

2. Q. Where is your road?

A. The Connecticut River Railroad runs from Springfield, Massachusetts, to the State line on the north, fifty miles, at South Vernon.

3. Q. Will you state what degree of attention you gave during that time to the duties of that office?

A. As president of the road I have endeavored to give some attention to every department. I have, of course, a corps of officers, such as master mechanic, superintendent, etc., but I have general supervision of all the officers and men on the road.

4. Q. What opportunities have you had of becoming acquainted with the mechanical arts, and particularly of that part which consists in working iron?

A. From 1848 to 1868 I was the owner of a considerable machine-shop, which was entirely independent of the railroad; it was a private machine-shop connected with my other business, and I was always in the habit of giving a good deal of attention to the working of every part of said machine-shop.

5. Q. Has your road, during your presidency of it, been in the habit of patching damaged rails, and to what extent has it been practiced?

A. We began to patch our rails about 1855, and have continued it until within two or three years.

6. Q. What description of rails have you had occasion to mend, and what in general has been the extent of the damage to be repaired?

A. Our rails are like all other rails commonly used, a T-rail or an H-rail. We have been in the habit of mending as other people have mended, taking them up when battered and carrying them to the shop and mending them, and restoring them to the road. We have
1225 always had two fires, but rarely worked to exceed one, that is to say, some parts of the year we didn't mend many rails and worked but one fire, and parts of the year worked another; some months there would be more rails and some less, and we worked according to the necessities of the road. A road generally has an overhauling in the spring, and then there would be more mending.

7. Q. What kind of a block or machine have you used in mending rails; and, if more than one, please describe them both, and state to what extent each has been used.

A. We have used throughout the most of my administration of the road a common blacksmith swage-block heavy anvil, with forms on it to accommodate the rails; not the patent machines that are here exhibited, but a simple swage-block. We bought one of these machines in the year 1858, and gave it a thorough trial. It happened in this way: I was traveling in the West—looking about—and saw a machine that struck me very favorably. I think I saw it at Cleveland—at all events it was made at Cleveland. I was impressed that it was a good thing, and I purchased the machine, or caused it to be purchased, and had it set up in our machine-shop at Northampton. The machine that I bought at Cleveland, I find by reference to my notes was bought in 1858; it was set up in our blacksmith-shop, and I felt considerable interest in its being a success, partly because I had judged it to be a good thing by seeing it out here. I watched the machine with considerable interest, hoping to find an advantage in using it; afterward I went off a few days or few weeks; and when I returned my blacksmith and also master-mechanic reported to me that they could not do as good work on it as on the common anvil, and that they had returned to the common anvil and swage-block. I protested that they had not probably given it a sufficiently thorough trial, and I urged that it be further used, which was accordingly done; but after some time, I cannot say how long, I inquired after it again, and was told that they were satisfied from a longer trial and experiment that there was no advantage in using it, and that if left to themselves they would not use it any more.

1226 (Counsel for complainant objects to any statements made to the witness by others, as hearsay evidence.)

I then, after, perhaps, two or three months, gave it up as useless to try to do anything with it, and I said no more as to its use, and it fell into total disuse.

8. Q. Please look on the model marked "Cleveland vise, or Whitcomb machine," and state whether that is a correct model of the machine you introduced from Cleveland.

A. Well, it is at least twelve or fourteen years since I had it in the shop, but this is as I recollect it; considering the period of time intervening, this is as near as I could describe it, or as I recollect it.

9. Q. Have you used a furnace or not with a fire, and how many men has it required at each fire?

A. We used a blast-furnace, burning from a peck to a half-bushel of coal at a time.

10. Q. Please state fully, without being specially interrogated, the history and process of rail-mending on your road, both on the common grooved anvil-block and on the Cleveland machine, marked "Cleveland vise," with a view especially to show the comparative value of the two instruments.

A. As I remarked before, we began to mend rails about 1855, (probably did something at it in 1854,) but we have kept right along from that time to within about three years, not always mending so many as we did at sometimes; sometimes when new iron was at a high price, we would mend more rails, and sometimes occasionally would discontinue practically for some time. A railroad is thoroughly overhauled in the spring, and the rails taken out and mended; we have kept up the practice of rail-mending through all that period, from 1855, certainly, to 1868 or 1869, not having entirely ceased from it yet. We have mended a few rails within six months, but we don't mend near as many as we did ten years ago. One reason for that, I would state, is the fact that we do not find
1227 the ends of our rails crushed as badly as they used to be when we had harder chairs; of late years we have been using the Howe splices at the joints of the rail, with which the rail wears comparatively longer than it used to. When we began to mend rails we had a better article to mend. The iron that was in our road originally was worth more than any of the modern iron, and the rails would wear longer; we were very fond of mending this iron because there was a great deal of value in it, but the modern rails do not last after they are mended; we have put rails in our track that have needed welding up in six months; since the introduction of steel rails, we have almost wholly ceased to mend the remaining iron rails. We used the machine experimentally, because we never were settled in the faith that it was a good thing. I had a pride in having the machine succeed, because I judged it was a good thing, and when I ordered it sent to Northampton thought I was doing a good thing for our company, but we used it for only a short time; whether it was one month or three months I cannot say, but we ceased to use it because we did not think there was any profit in using it.

11. Q. Did you use it enough, in your judgment, to give it a thorough test?

A. Yes, sir. I was satisfied, and our superintendent, blacksmith, and master-mechanic were satisfied.

12. Q. If the work done on the smooth anvil-block was better than that done with the Cleveland vise, please specify wherein it was better.

A. We found that great skill was required; that there was great difficulty in mending rails well in that machine, because the iron would not stay heated long enough to be manipulated. There was but little time lost in getting the rails into the jaws, but the iron in the jaws contained so large a mass in it that the moment the cold knuckles of the jaws took hold of the rail the heat went off by communication so rapidly that before we could get the rail prepared to weld it it was too cold to weld; and while we could finish it off and make it look well,
1228 the result was it would not wear, although the rail looked better (because it could be hammered up smoother) than when mended on the common anvil. We thought it better to mend our rails for use than for beauty.

13. Q. Please state whether you had sufficient personal knowledge upon the subject to form a judgment; and, if so, state what, in your opinion, was the average amount of mend, in feet or inches, per rail.

A. I will state that I have two means of answering that question,

and I will say that one of them is upon a basis so certain that it ceases to be a matter of judgment with me, because I have positive information; but if you will allow me, I will tell you what my means of information are.

(Question repeated.)

A. I would say there are very many rails mended in more than one place; many mended at each end; some at one end and in the middle; some mended in the middle and not at either end. My judgment of the matter was that the welds were about eight inches at the time; maybe between seven and eight inches—say seven and a half on an average, would be my judgment.

14. Q. You mean in this the average length of each weld?

A. Yes, sir. I was always in the habit of paying a good deal of attention, when about the shops, to the appearance of the rails, as to whether wastefully or economically mended, and I became quite familiar with patches and mends.

15. Q. Was any account kept of the amount of mending done per day or month; and, if so, under whose direction and by whom was it kept, and is the book containing such accounts now in your possession as president of your road?

A. I would say in answer that it has been the practice at our machine-shops and blacksmith-shop to keep a separate account, and reckon it up every day, of every kind of work; as for instance, if a blacksmith worked one-half a day repairing the locomotive Northampton, and one-half a day mending rails, when we were recording the work it was talked over as to how many hours of work was expended on each. Such is the record we have kept for the last thirty years; and I find, by
1229 consulting our record, that the subject of mending rails was confined to a particular book; that that book had entries made in it showing the aggregate of the whole business for the month, showing how many days' work of the blacksmith and helpers had been devoted during that month to mending rails. It shows likewise how many pounds of coal were used in that mending, and the number of pounds of iron, and even how many baskets of charcoal were used; and, in the same connection, how many rails had been worked upon, all told; how many places mended or welded, and whatever there may have been done upon them; the aggregate number of rails, and after a little while—the first two years—I find entered the prices of coal and iron, and number of feet and inches accomplished in each month. The book I hold in my hand contains the information I have stated. I open, for instance, at August, 1858.

By Mr. CURTIS. I shall call for this book to be put in evidence.

By Mr. NILES. We shall not object if Mr. Harris does not. A copy may be all that you would need.

By Mr. CURTIS. I think we are entitled to the original document. We can arrange about the copy afterwards.

John Hallahan worked fifteen days, $18.75, which would be about $1.25 per day.

Pat. Hickey, fifteen days, $13.50, which is about ninety cents a day.

Pat. Downing, fifteen days, amounting to the same, $13.50.

That is the extent of the labor account. Then five thousand two hundred and fifty-four pounds of coal, at eight dollars and fifty cents a ton, amounting to $22.32. Four hundred and fifty-five pounds of iron, at four cents, amounts to $18.20. Ten bushels of charcoal, one dollar, which foots up, if there is no mistake, to eighty-seven dollars and twenty-seven cents ($87.27.)

1230 Two hundred and four rails were worked upon, and on this two hundred and four rails were mended two hundred and sixty-four deficiencies on the top and thirty-three webs. The total measurement was (184½) one hundred and eighty-four and a half feet; that, I should think, was not very far from fifty cents a foot, fifty or forty-eight, somewhere along there. Then the book goes on to state—to make the account complete—that there were sent of these rails one hundred and sixty-two to the section in charge of a repairer by the name of Jones; twenty-six to the charge of repairer by the name of Egan, and sixteen to the section kept in repair by Philips; that accounts for the 204 rails. I have read this to illustrate the manner of keeping the record. The whole book is kept upon precisely that basis. For two years, to wit, 1855 and 1856, the precise length mended is not stated, but afterwards the amount in feet and inches is stated all the time.

16 Q. Have you carefully examined that account? And, if yea, please state fully the results shown by it as to numbers of rails mended from time to time, the amount of mending done per month or year, and the cost to your company for labor, fuel, and new iron used in such mending, per foot, and if you have a tabular statement of the result, please produce it and attach it to your deposition.

A. I have taken the book and aggregated the results here for each year, and I find them to be as follows: In 1855 we mended two thousand six hundred and eighteen (2,618) rails, putting four thousand and sixty (4,060) patches on the surface of the rail, and we repaired two hundred and sixty-one webs. I might state that the web is the thin lower part of the rail, and when a corner was broken off and we mended it, we made a distinction between that and the surface of the rail. For this year, 1855, these mendings were computed to be two thousand four hundred and fifty-nine, (2,459,) at a total cost of nine hundred and three ($903.14) dollars and fourteen cents. In the seven years the averages are found to be forty-six and a half cents (46½) per foot. This statement here spoken of I here produce,

1231 EXHIBIT A.—*Deposition of Mr. Harris, H. W. B.*

Exhibit of rail-repairs on Connecticut River Railroad during seven years.

Years.	Number of rails rep'd per year.	Kind of repairs.		Total feet of patched per year.	Total expense per year.	Total cost per foot for patching per year.	Remarks.
		Tops.	Webs.				
	No.	*No.*	*No.*	*Feet.*		*Cts.*	
1855..	2,618	4,066	261	2,459	$903 14	36½	The average length of patching in 1855 and 1856 is estimated at 7 inches for tops and 4 inches for webs.
1856..	3,983	6,652	1,117	4,252	2,310 59	54½	
1857..	4,410	7,028	894	4,895	2,620 62	53½	
1858..	3,520	5,365	705	4,055	1,706 40	42	
1859..	3,431	4,881	1,021	3,340	1,551 63	46	
1860..	3,371	4,645	911	2,897	1,301 67	45	
1861..	3,435	4,971	896	2,769	1,344 07	48½	
7 yrs.	24,769	37,608	5,805	24,667	$11,738 12	Average 46¼ cts. per foot per yr. during 7 yrs.	

1232

1233 marked "Exhibit A," in this deposition. At the request of the complainant's counsel, I also hand him the book from which I read statement in first part of answer to fifteenth interrogatory for his inspection.

17. Q. Please state what was the average price of labor of the different kinds employed in rail-mending, and of coal and iron—new iron—used during the years referred to in that book.

A. The coal amounted, so far as I have examined, from three hundred and twenty-five to three hundred and fifty pounds a day used. The book would show exactly. The iron I have not looked at so particularly. It is my impression that the book would show not far from two and a half pounds to the patch.

18. Q. I am not referring to the quantities, but to the prices.

A. Through that time coal was sometimes seven dollars, sometimes eight and a half dollars, which was pretty high. I should think the price was, say, eight dollars, and the iron probably from four cents to four and a half, on an average.

19. Q. And the labor?

A. During that time I should think the average may have been eight shillings a day for blacksmiths and a dollar a day for each of the two helpers.

20. Q. Please state in dollars and cents; shillings have a varying value.

A. One dollar and thirty-three cents for the blacksmiths, and a dollar a day for each of the two strikers. That was the price which was paid generally in the shop for strikers.

21. Q. Please to explain more fully what items of cost are included in this Exhibit A, specified in the book referred to.

A. It is labor, coal, and iron, and a small item for charcoal. This includes everything except the power that blew the fire, derived from the general source, and what you might call rent for the shop, use of the hammers, and things which we paid no attention to in our accounts.

1234 If these smiths spent one-half a day mending their own tools, or anything in their province, it was all included. The expense of purchasing tools, furnaces, hammers, and so on, part of the cost of the shop being already fitted up, were not taken into the account. The account really includes labor, coal, iron, and charcoal, and such little tools as they destroyed from time to time and repaired themselves, which would not amount to enough to affect anything.

22. Q. State, as nearly as you can, the average cost for those items per foot, the amount during those years.

A. The tabulation shows forty-six and a half cents for the whole seven years worked out. The average yearly costs are added up and divided by seven.

By Mr. Curtis:

Q. Running where?

A. From the beginning to the end of that time—from 1855 to 1861, inclusive.

23. Q. Have you ascertained, and please state, if you can, the average number of feet mended per day at a single fire?

A. That is a matter of which I would have to answer more on my judgment. I should say fourteen or fifteen feet. The book, by taking pains enough, would tell precisely. But I have only looked at it, and never thought of it in that way until very recently; thought more of having the work well done and done quickly. I should say about fourteen or fifteen feet per day, as we did our work, for we meant to do it very thoroughly.

24. Q. When you were experimenting with the Whitcomb machine, and when you abandoned its use, had you any knowledge or suspicion that it infringed any patent?

A. No, sir; I had none whatever.

25. Q. Did any such apprehension have anything to do with inducing you to abandon it?

A. It had not. I had not heard of any patent. I was moved to get the machine from a sincere opinion that it would be a good thing. In that my judgment was at fault, as it proved not to be a good thing. We abandoned it because it was not what we expected to find it.

1235 26. Q. Have you any similar book of accounts as to the mending of rails for the years subsequent to 1861? Or, if not, state wherein the accounts were differently kept subsequent to that time.

A. At this time we moved our machine-shop from Northampton to Springfield, and changed clerks, and for some little time did not mend many rails, but still did not change our general system of keeping accounts; we kept the run of our mending, and we have books down to this present time, but they are not so complete, for the reason that our clerk was but little impressed with its importance; and after I thought we had arrived at our best estate in mending rails I took less interest in it, though it continued to be the duty of the clerk to attend to it. It is in our power to make the account complete; the clerk, for instance, has not continued the labor-account, but his excuse would be that he did not continue it because you can turn to the labor-account in the other books, and it is not necessary to carry out the labor-account in this. The labor-account is not in it at all; I did not know of it until after I had left Springfield. It is in the book at the office; it has the number of feet and number of rails, amount of iron, but not the particulars; it is a less perfect book, and contains the last entries—the last rails we mended, which seems to have been in May, 1872; then only so little that a single line contains it all. We stopped mending rails in 1869, yet have a few rails taken up and welded; but rail-mending, as a business, on the idea that it is a profitable thing to do, has ceased; what we do is merely for convenience.

27. Q. You speak of mending webs. Will you state how the expense of mending webs compares with that of patching the surface—top of the rail?

A. Well, sir, the web, as a general thing, has a triangular piece of deficiency, say an inch and a half wide, wedge-shaped, running to a point, maybe four inches long, maybe eight; it is a piece broken out

1236 by the large bolt in the chairs, when the rails were hove out of place by the frost, and it was a more difficult thing to do—required more skill—was more perplexing to do.

28. Q. Did you experience any difficulty in mending fish-plate rails on the common anvil as to the condition of the holes in the neck?

A. We did not have holes in the neck, sir.

29. Q. Yours were the wooden ones?

A. Yes, sir.

Cross-examination by Mr. Curtis:

1. X Q. Who is the present vice-president on your road?

A. Mulligan.

2. X Q. What is his first name?

A. John—John Mulligan.

3. X Q. He was formerly master-mechanic on your road, was he not?

A. Yes, sir.

4. X Q. As master-mechanic, he had the practical and immediate charge of the work of mending rails, had he not?

A. Yes, sir.

5. X Q. Do you know whether, at any time, Mr. Mulligan himself kept an account in which there was an estimate of the cost of mending your rails?

A. I know that he went West at one time to testify on the subject; I didn't know, at the time, that he kept any special account; these are the accounts in his office; no other accounts except these, sir; no other accounts that I know of.

6. X Q. Didn't you ever see a pasteboard-book, considerably larger, containing entries in regard to these facts?

A. No, sir; those are the blacksmith-books, from which these are taken. When we state here that eight hundred pounds of coal were used, it is information derived from the pasteboard-books.

1237 7. X Q. Are any of the entries in these books in your own handwriting?

A. No, sir; none of these.

8. X Q. Were these other books?

A. No, sir; the most I have done I have made a few pencil-marks very recently. I never put a pen or pencil to them for the purpose of making any entry.

9. X Q. You have no personal, no actual knowledge in regard to any of these entries?

A. I don't know what you call actual.

10. X Q. You have a belief but no knowledge?

A. I have just that knowledge which the master has of the doings of his servants when he directs them what to do, and finds the returns made that it is done.

11. X Q. Where these entries are actually not made by you, you simply suppose them to be so; did you ever compare the work with them, or see the returns from which these entries were made up?

A. I never did. Neither do I compare all other transactions. I have just that knowledge which the master has of the transactions of his servants when advised that the order is obeyed.

12. X Q. Mr. Mulligan would have personal knowledge on the subject?

A. It would be one remove from my knowledge. He would not be likely to count the rails or weigh the charcoal. He would send his men to do it.

13. X Q. It would be one step nearer than your own position, would it not?

A. It is nearer his duty because he is one step nearer these men.

14. X Q. Where is he now?

A. In Springfield; he is in our service.

15. X Q. You speak of having purchased in the West a block
1238 having a movable jaw; are you quite sure whether or not the jaws of that block proved to fit your rails when you came to get it in Springfield?

A. Yes, sir.

16. X Q. Did it fit the rails?

A. Yes, sir; our business was to make it fit. We built the machine, we having first bought the parts and put them together ourselves. We made the machine in good faith, and I never heard any complaint that it did not fit the rails.

17. X Q. Mr. Mulligan must have been mistaken if he testified that it did not?

A. I would not want to impugn his testimony. You must remember that there is a great variety of rails; no machine could be made to fit all the various patterns. There is no road that has not at least half a dozen forms of rails. The machine was made to be an average fit for our rails. Sometimes one of the rails was one-eighth of an inch higher, sometimes would be one-sixteenth; sometimes a rail would be three and a half, sometimes three and seven-eighths, perhaps, and we have at least one-half an inch difference in webs of rails to mend.

18. X Q. You speak of the rail being somewhat cooled when placed in the jaws you used.

A. Yes, sir.

19. X Q. After three or four heats had been taken, does not that machine become heated, and do you know whether or not it is a common practice to throw water on it because it gets too hot?

A. I have seen water thrown on it because it was too hot to be comfortable for the workmen.

20. X Q. If it was too hot to be comfortable for the workman, it could hardly be said to be likely to cool the rails so as to hinder its being welded?

A. Yes, sir, it would; the difference between them and the heated rail, when hot enough to be welded, is such that it may be said to cool the rail very rapidly.

21. X Q. You feel confident from your observation that, in point
1239 of fact, the jaws of such a machine cools the rail to a serious extent?

A. I do, sir.

22. X Q. And you feel as confident of that as you do in regard to anything else you have testified to?

A. No, sir; because most of my testimony is what I call absolute knowledge; that is, to the feet and inches, number of rails, etc. I would like, Mr. Curtis, if it would be proper, to get the date in respect to what Mr. Mulligan testified to. During the war, when prices were at least double what they were in time of peace, I know that rails cost more than forty cents. Iron went up to seven cents a pound, and instead of paying my blacksmiths one dollar and thirty-three cents per day, we paid them two dollars and seventy-five cents per day, and didn't get any more done. I have not a doubt that some of the mending in 1860 that cost fifty cents, in 1864 cost more than that; I have no doubt seventy cents; perhaps more than that, possibly eighty cents, by reason of the increased cost of labor and material; you can take that book and apply your principles to 1858.

22. X Q. Don't you think that after 1861 it cost as high as seventy cents to the patch?

A. No, sir; I have no idea it did; that we did some patches that cost far more than that is likely.

23. X Q. The cost of labor and material was more than doubled afterwards?

A. I don't think we did as much when we paid the laboring man one dollar and seventy-five cents instead of ninety cents; you know you don't get the same amount of work for one dollar and seventy-five cents that you do for ninety cents, and, therefore, I should expect if you were to find what it cost in 1865 to mend rails, that it would be, if anything, greater than what was due to the difference in prices, and that would be one element in the calculation—the difference in the amount of labor.

1240 24. X Q. That is undoubtedly true. How much of your time, do you think, personally did you give to that Whitcomb machine after it was set up at Springfield?

A. It was not set up at Springfield.

25. X Q. At Northampton?

A. It is fifteen years ago; I cannot say what days or hours I specially attended to it; whether I saw it two times or six times a day or week I cannot say; I can say that I felt a special interest in having that machine succeed, and felt very confident that I had done my duty. I felt it to be my duty, because there was nothing to be gained in its further use, to discontinue it?

26. X Q. The matter of continuing to use it would be pretty much determined by Mr. Mulligan, would it not?

A. Pretty much. It was his duty, and yet it was done after consultation with me. Although president of the road, I have that idea of his duties that I don't attempt to run the trains or hire blacksmiths. I do a great many things through Mr. Mulligan that he may, and does, assume are his acts, if he has a proper respect for his office, as he does.

27. X Q. In working iron, is it, in your judgment, important to integrate and bring into close connection as possible, and can this be done most advantageously by the use of a light or heavy hammer?

A. There can be too heavy hammers as well as too light ones. The hammer must be in proportion to the block pounded.

28. X Q. Suppose the mend to be about the end of the rail, what sized hammer as to weight should you say would weld iron on that rail-head to the best advantage?

A. In one of these machines or out of it?

29. X Q. Of course my question implies that the iron is put somewhere where it could be pounded. I didn't confine myself to this machine.

A. The difficulty is, with these machines, that you cannot get the drop-hammer that weighs a ton to work, while such hammers as strikers of proper strength use are the best ones.

1241 30. X Q. You never knew of the Western Road from Boston to Albany doing this work with drop-hammers?

A. I know that they have them, but I cannot say I saw them mending rails. I pass their shop every day, but am so much interested in my own that I don't pay much attention to their rail-mending. You can make a rail look very well, although it is not mended at all. It can be pounded up so as to look very well, but when it is put out on the road-track it is like a cabbage, and will go down, and although it looks well won't hold. We thought more of welding them than of their looks.

31. X Q. Don't you think that a patch can be welded on to the rail better if you use a sledge weighing from fourteen to sixteen pounds than it can be tacked on it with light hammers?

A. Undoubtedly. The big blows are necessary to bring it up together, but the little blows are required for turning and polishing it.

32. X Q. The welding on the common anvil is done with a very light hammer?

A. No, sir.

33. X Q. How heavy a hammer do you use in patching rails?

A. I have seen them using a hammer weighing six or eight pounds, but, as a general thing, I have seen them using hammers weighing at least twelve pounds. We use the hammer that makes the best weld. We succeed in making the iron stick when welded up, but in later years we got a great deal of poor iron.

35. X Q. Are you sure you have seen men using hammers weighing

what you stated in patching; were not those heavy hammers used in swaging?

A. I could not say. Although my name was down in the directory as a blacksmith, I am not one. I don't believe I could mend a rail myself. I know when it is well mended. I have stated these facts to show
1242 that, not being a blacksmith by occupation, I cannot answer very accurately as to the weight of the hammers or sledges.

36. X Q. Do you feel at all sure the hammers weighing more than seven pounds were used in welding rails or not?

A. I do not feel at all sure how heavy they are. I know I have seen them use them with both hands, from which I should infer the hammer might weigh about eight or nine pounds.

37. X Q. Do you now recollect of seeing yourself any of the rails which you knew to have been mended on the Whitcomb block during the few days it was experimentally used as to whether they proved, when put into the road, imperfectly repaired?

A. I did not follow them onto the road.

38. X Q. So far as your knowledge extends they were as well mended as they were the other way?

A. My knowledge came to me from my workmen and Mr. Mulligan; and their statements were that the rail could not be so reliably mended and could not be done cheaper; and these two statements received my entire assent, and resulted in the abandonment of the machine. I believe the machine to be entirely worthless, and that the men who are using it will be disappointed in its results.

39. X Q. Do you know what quantity of iron per foot is used by your road in mending rails?

A. I know by these books. It might be got out by a little trouble. My idea is that it was between two and three pounds to a patch. That conclusion I come to from standing over the workmen and seeing the pieces cut off, and from casually looking over the books.

40. X Q. What are the dimensions of the iron used?

A. We have a great variety of rails in the shop. It would depend upon their form and quantity of the break. I never concerned myself about that. I should say that the patches put on are one-half an inch
1243 thick and two and a half wide. I think that was about a fair representation of the patch. We had several thicknesses. We put on the patch according to the place to be mended.

41. X Q. Can you state the dimensions of the bar of iron commonly used in mending rails?

A. Only in the way I have done it, sir; I have never been familiar enough to say whether it is wider or thicker; I did not purchase the iron, nor dictate the purchase of what the shop used.

42. X Q. Will you place the books you have last referred to in the hands of the examiner, to be made exhibits in this case--the book from which you have read?

A. The other books?

43. X Q. Yes, sir.

A. I merely state that they are not complete; they do not contain the labor account, and are entirely useless as a means of information in the case.

44. X Q. Please hand to the examiner the two books referred to in your last reply, to be made exhibits.

Examination adjourned to Monday morning at 10 o'clock a. m., Nov. 24, 1873.

Examination resumed.

(The books referred to in the above examination were offered in evidence, and are hereto attached, marked respectively "Exhibits A," "B," and "C." "Deposition of Mr. D. L. Harris.—H. W. B.")

By Mr. Curtis:

45. X Q. You have stated before, in the cross-examination, that the books of account, Exhibits B and C, subsequent to 1861, are not complete, and do not contain the labor account. Will you please look at the book, Exhibit B, and state what is meant by the names on the first, third, and fourth, fifth, sixth, seventh, eighth, ninth, tenth, eleventh, twelfth, thirteenth, and fourteenth pages, and the sums set opposite those names, and whether these do not show the parties to whom money was paid for labor, the amount paid to these parties?

1244 A. The first four pages, being January, February, March, and April do, but after that they are different in that respect.

46. X Q. Look at the account for June and for July; is not the labor given there?

A. It is not, sir; no, sir; these are the men to whom the iron is sent—two hundred and forty-three rails; these are the sections to which the rails were sent, and these the men presiding over the sections; you will find that these numbers will foot up the number of rails mended.

47. X Q. The first four months give the labor?

A. Yes, sir.

48. X Q. In whose handwriting are the earlier entries in Exhibit B, if you know?

A. I could not tell you.

49. X Q. Is it not the same handwriting as book Exhibit A?

A. I rather think it is, the first four pages; after that there is something very different; I could not say the precise time when the clerk was changed; I did not pay any particular attention latterly; in fact, the business was done at the general office, and I suppose sometimes one clerk did it, and sometimes another.

50. X Q. Do the books of your company at Springfield show the cost of iron used during the period after May, 1862, and running down through this account, so that from your books and these books it could be ascertained, if desired, what it cost between 1861 and the period when you ceased to mend rails?

A. It is my impression that they do, sir; I could not say positively.

51. X Q. You have not as yet made any effort to ascertain?

A. No, sir.

52. X Q. But you are of the opinion that the cost was considerably greater than prior to 1861?

1245 A. Not a doubt of it, because I know that labor was seventy-five per cent. higher, and coal was as high as fifteen dollars a ton, and iron was seven cents a pound, so that I have no doubt that the price would be largely advanced in later years. I think it would be a very easy way to get at it: take the price in any month in a year and apply that price to each of the same months in other years, and find about what it cost; for instance, any month of any particular year, ascertain the prices which were obtained in that month to each year, would give a different price than obtained in 1857.

53. X Q. You don't know from examination of the handwriting who made the entries of any of the three books?

A. I know the man, but don't know his name; it is the same as not knowing him at all. It was a great many years ago when the entries

were made. I knew it was a clerk I knew. We have had one clerk for the last six or eight years who would have made the last entries.

54. X Q. I believe the closing question I put to you the other day was not put down on the record, nor was any answer made to it. It was whether or not you are an officer of the association of eastern railroads?

A. Yes, sir; I am.

55. X Q. What is your relation to that association?

A. Scribe, or secretary.

56. X Q. State whether or not any of the members of that association have been sued for infringement of the Cawood patent.

A. I learned from you to-day that some either had been sued or would be.

57. X Q. Were you not aware before you talked with me that some of your members had been sued?

A. I knew that some two or three years ago, quite well, it was expected that they would be. I have been sued so often I have got used to it. I cannot tell you actually.

58. X Q. Are the Old Colony, the Boston & Maine, and Fitchburg Roads members of your association?

A. Yes, sir.

1246 59. X Q. If you desire to make any explanation in regard to any entries found in the books Exhibits B and C, please give it to the examiner.

A. I have no explanation to make in particular; I simply say that the books contain many or quite a number of notes which are not original, which I did not want to be considered as being put into the case as testimony from original sources; that is about all I have to say. There has been a good many hours consumed; I think there has been a great deal of unnecessary fuss about this whole business. I don't think the books are worth anything to you or any one.

60. X Q. The entries you have referred to are in pencil, are they not?

A. I think they are; I dont think I put anything in ink.

61. X Q. The entries in ink you consider original, don't you?

A. That I cannot say; my impression is they are, sir. I didn't make them for my benefit. There has been no ink used about it, I think.

62. X Q. Will you state any reason whatever for questioning the originality and authenticity of any of the entries in Exhibits B and C which would apply equally to Exhibit A?

A. None that I know.

63. X Q. For all you know, the one is entitled to equal force with the other?

A. That is my impression, sir.

Redirect examination by Mr. Jewett:

Q. Please state when these pencil-marks and memoranda were made by you, and under what circumstances.

A. They were made since I determined to come to Chicago; and while musing on the cars, I may say. I had this subject in my mind,

1247 and looking this over I now and then made some memorandum, having no other paper, and not thinking that these books were of the least use.

(By consent of the counsel for complainant and defendants, the signing of this deposition by the witness is waived.)

F. M. HUTCHINSON.

1. Q. Please state your name, age, residence, and occupation.

A. F. M. Hutchinson; age, 42 years; reside in Pittsburgh.

2. Q. State what official relation you hold to the Pittsburgh, Fort Wayne & Chicago Railway Company, if any.

A. Secretary and treasurer.

3. Q. Of what?

A. The Pittsburgh, Fort Wayne & Chicago Railway Company.

4. Q. How long have you been that officer?

A. About eleven years, sir.

5. Q. Look at this paper and state, if you please, what it is, and how you know it to be such.

A. It is a copy of the lease between Pittsburgh, Fort Wayne & Chicago Railway Company and the Pennsylvania Railroad Company.

6. Q. Dated when?

A. 1869.

(Paper handed to the witness, and is offered in evidence, marked "Lease of the Pennsylvania Company, Dep. of F. M. Hutchinson." By consent of counsel the copy is admitted in place of the original lease.)

7. Q. State how you know this to be a correct copy.

A. To the best of my knowledge and belief; I have compared the proofs with Mr. Sunnott, and I believe I know this is a true copy of the lease between the Pittsburgh, Fort Wayne & Chicago Railway and the Pennsylvania Railroad Company.

8. Q. Did you see the original lease?

A. I did.

1248 9. Q. You compared it with the original lease, did you?

A. Yes, sir, I did.

10. Q. Did you compare it with the printed copy?

A. The proof as it came from the printers, with the original lease, with the printed copy.

By Mr. CURTIS. June 7th, 1869, (referring to date?)

A. Yes, sir.

11. Q. State, if you please, Mr. Hutchinson, where the accounts of maintenance of way, rails, etc., belonging to the company, are now.

A. They are now in the vaults of the railway company.

12. Q. Please make it more specific in regard to the railway company, from its organization in 1862 down to the present time. State if you please, for instance, whether you located the accounts with the accounts with the railroad company or not.

A. The books of the railway company and their accounts are kept in the vaults of the Pennsylvania Railroad Company; they are kept there by reason of their greater security. I have the immediate charge of all the property of the company, such as books, rights of way, maintenance of way; in fact, all the property belonging to the company except the railroad and its appurtenances.

13. Q. Have you anything to do with the making up of the annual reports of the railway company?

A. I do when we make reports.

14. Q. I mean anterior to this consolidation?

A. Yes, sir; the maintenance of way and other accounts were handed to me some days before the annual meeting.

15. Q. And you superintended the printing of them?

A. Superintended and corrected the proof, when it could be got ready in time for the meeting, but always corrected the proof, to see that it was in proper order before it was allowed to go before the stockholders.

1249 16. Q. Does the president's report contain all those furnished by the different officers?

A. Yes, sir; for instance, Mr. Cass makes a general report upon all things belonging to the company, and refers to the superintendent of railway for matters connected with that department, and to the chief engineer for care of track, bridges, etc.

17. Q. On whose report would the account be for maintenance of way, wear of rails, etc.?

A. Mr. John B. Jervis; he was chief engineer.

18. Q. Is he still connected with the road?

A. Not connected with the road, but with the organization, as I am.

19. Q. Is the organization of the Pittsburgh, Fort Wayne & Chicago Railway still maintained as before the lease?

A. Yes, sir.

20. Q. Save and except what—that you do not manage the road?

A. That is all.

21. Q. Now, Mr. Hutchinson, referring entirely to the time before the lease, I have already asked you who made the reports in regard to maintenance of way, and you answered Mr. Jervis. Who succeeded Mr. Jervis in his office, if he left?

A. He didn't leave until just before the lease was made. Mr. H. A. Gardiner succeeded after Mr. Jervis' retirement, about the time of the lease.

22. Were the accounts and reports of the chief engineer, of maintenance of way, and so forth, very voluminous for a number of years?

A. Oh, yes.

23. Q. You have already stated that they are in the vaults of the Pittsburgh, Fort Wayne & Chicago Railway—the accounts of maintenance of way?

A. What do you mean by maintenance of way?

24. Q. The accounts of money paid for labor, track, repairing bridges.

1250 A. They are in the office of the Pittsburgh, Fort Wayne & Chicago Railway. We put them in charge of a book-keeper. When the rolls are returned, there is put on the back of them what is called a distribution of account: the total voucher is subdivided into different properties into which the money has been paid.

25. Q. These, I understand you, are filed every month in the office of the Pittsburgh, Fort Wayne & Chicago Railway?

A. Yes, sir; the rolls belonging to the chief engineer's office and all the subordinate offices, and they were taken to the auditor's office to be copied. They have duplicate rolls, I think. The rolls—the original rolls—that are certified to by Mr. Jervis. Upon those rolls is the distribution account.

26. Q. Could those papers be readily brought here, Mr. Hutchinson?

A. No, sir, they could not.

27. Q. It would be very laborious and troublesome, would it not?

A. Yes, sir.

Cross-examination by Mr. Curtis:

1. X Q. What official relation to the Pittsburgh, Fort Wayne & Chicago Railway Company has Joseph H. Moore held at any time, and what is his connection with the company now, if he has any?

A. Do you want my answer during the time since he commenced service for the road?

2. X Q. All the time.

A. He was at one time general superintendent; and when he moved to Chicago, he was then called general agent, subject to orders of the

general superintendent; and anything that was wanted done, of any character, he was directed to attend to it.

3. X Q. Was that his position in February, 1866?

1251 A. Yes, sir, I think it was; he was employed to the day the lease was executed; whether since then I don't know; but up to the time of the lease he was called, in the organization, the general agent of the Pittsburgh, Fort Wayne & Chicago Railway Company at Chicago.

F. M. HUTCHINSON.

CHARLES T. HAM.

1. Q. Please state your name, age, residence, and occupation.

A. Charles T. Ham; age, forty-nine; residence, Rochester, N. Y.; occupation, master mechanic.

2. Q. Have you ever at any time been connected with the management of a railroad; and, if so, when, and in what capacity?

A. In 1847, the year 1847, I took charge of the machinery department of the Little Miami Railroad, the engines and blacksmith-work, and all the entire charge of it. In 1857 I took charge of the same department on the Ohio and Mississippi Railroad, and in 1858 of the same on the New York Central.

3. Q. Are you still connected with railroad operations?

A. I am not.

4. Q. And what is your present business?

A. I am manufacturing in Buffalo; manufacturing steam-gauges and head-lights.

5. Q. How long have you been disconnected from the railroad?

A. I left the New York Central in 1872.

6. Q. Were you continuously engaged in railroad-work, say from 1847 to 1872?

A. Yes, sir; nearly all the time.

7. Q. Did you mend railroad-bars upon the Little Miami Railroad while in charge of its shops?

A. I did.

8. Q. Was that branch of business on the road under your special charge?

A. It was.

1252 9. Q. Did you have control of that department of the business in such a manner as to become familiar with the methods and cost of repairing railroad-iron?

A. Yes, sir.

10. Q. When did you first begin to mend rails on that road?

A. Well, in 1848.

11. Q. What sort of appliances did you make use of for that purpose?

A. The common swage-block.

12. Q. What was the dimensions of the block?

A. It was a block, for instance, two feet square by eight inches thick, with a groove on the side to fit the rail.

13. Q. That is, to hold the rail when it was turned down on its side?

A. Yes, sir.

14. Q. Did you know the expense of mending rails by that method upon that road?

A. I did.

15. Q. What sort of fire did you use; what sort of machine for blowing the fire?

A. We used a common open fire.

16. Q. Bellows or blast?

A. Blast.

17. Q. How many men to each fire?

A. Three; one blacksmith and two helpers.

18. Q. How long did you continue to mend rails upon that road in that way?

A. Up to 1854.

19. Q. State, in a general way, what was the expense or average expense of mending rails by that process during those years.

A. It cost the company about forty-five cents a foot.

By Mr. Curtis:

1253 Q. During what years?

A. From 1848 to 1854.

(Objected to as prior to the existence of the patent.)

20. Q. What did that include?

A. It included everything.

21. Q. What kind of iron did you use in repairing your rails?

A. Used common 2-inch, by $\frac{1}{2}$ or $2\frac{1}{4}$-inch by $\frac{1}{2}$-inch, sometimes $\frac{5}{8}$-inch thick. We used iron of such thickness as the mend demanded.

22. Q. What did the thickness of the iron used in repairing rails depend on?

A. Upon the amount of loss on the head of the rail; the amount that was to be laid on.

23. Q. Did the rails repaired by this process give good satisfaction as mended rails?

A. They gave very good satisfaction at that time. We did not consider it paid to repair after 1854.

24. Q. What did you do with the rails after 1854?

A. We had them all rerolled, except if we got short of iron, and wanted some for a particular use. Some time late in 1853 we used a movable jaw for about six months; that machine we got up ourselves from a sketch furnished us previous to the patent coming out, and put on that machine patent applied for; that is the experiment we made with that block.

25. Q. What was the result of the use of that machine?

A. We used the machine about six months, and didn't find it of use; in short, didn't consider there was any advantage in it, and threw it overboard.

26. Q. What objections did you find to its use?

A. There was no serious objection, only we didn't consider it economy to purchase the right to use it, as we considered the plain block equally as good.

1254 27. Q. According to your experience with it in that shop was this jaw-block of any advantage in the mending of rails?

A. I never considered it of any.

28. Q. When you went upon the Ohio and Mississippi Railroad, did you find that they were repairing rails on that road?

A. Yes, sir.

29. Q. What were they using?

A. The plain block.

30. Q. How long did they continue to use that in repairing rails to your knowledge?

A. About three years we continued it, and finally abandoned the whole thing.

31. Q. Did you use the plain block so long as you continued the repairing of rails?

A. Yes, sir.

32. Q. Did you have occasion to know the expense of repairing rails?

A. Yes, sir; I kept an expense account.

33. Q. Are you able to state, and if so, state what was the cost of mending rails on that road per foot?

A. From forty-five to fifty-five cents.

34. Q. What did that include?

A. Coal, iron, and labor.

35. Q. You went on to the New York Central in 1868?

A. In 1868; I think in April.

36. Q. Were they mending rails on the New York Central at the time you went there?

A. They were.

37. Q. What were they using for that purpose?

A. On the western end they were using the plain block. That is the only portion of the road that came into my department.

38. Q. Do you know the cost to the New York Central Railroad of repairing its iron?

A. Yes, sir; it cost about fifty-five cents a foot.

1255 39. Q. Was the iron mended by contract?

A. No, sir, not at that time; by the day.

40. Q. Where was the shop at which the mending was done under your direction?

A. In the suburbs of Rochester—shops of the New York Central Railroad.

41. Q. What sort of appliances did they use for the fire?

A. A common open fire; a portion of the time a hand-bellows; most of the time a power-blast.

42. Q. What, according to your observation, was the general condition of the rails which came into the shop for repairs?

A. On a rail, or quantity of rails?

43. Q. The general average of the rails the whole length.

A. The general condition was, some came in with the crown broken, some have the ends broken; some have to be patched on the top, and some at the end.

44. Q. You sometimes found rails, one portion of which becomes battered at the end, while the rest would be in good condition?

A. In some cases it might be at one end battered, and, as you advanced from the bad end into the middle of the rail, it would be in good condition.

45. Q. When a rail, in that condition, comes to the shop for repairs you would mend it?

A. Always.

46. Q. What would be the ordinary life of a rail, such as is sent to the shop for repairs, after being mended?

A. Iron, after it has to be repaired, put into the track of the road where the traffic is as heavy as the New York Central, would not last thirty days, and I have seen rails that would not stand two days.

47. Q. About what is the average wear of iron rails, such as you have put down?

A. That would depend upon the traffic; with such a traffic as
1256 the New York Central, the life of a first-class iron rail would be about six months. It would vary on different roads; on some

western roads it might last from six to ten years. Some roads last less and some more.

48. Q. Mr. Ham, please describe more fully the construction of the machine that you have stated you constructed on the Little Miami Road, on which you marked "patent applied for?"

A. Well, the construction of the machine was simply this: one side of the machine was a loose jaw worked with a cam, with a wrought-iron band around the same, which hitched into the jaw and drew it back, with a V-shape.

49. Q. Do you know, and, if so, state who claimed to have been the inventor of it?

A. I understood it belonged to Mr. Cawood.

By Mr. Niles:

50. Q. Please state, as nearly as you can, during the time you was master-mechanic on the New York Central Railroad, what was the average amount, in feet and inches per day, of rail-mending done on that road by a blacksmith and two helpers at a single fire, on the common anvil; and whether you had the means of forming a correct opinion on that subject?

A. It ran from seventeen to twenty feet. The way I obtained my knowledge in that matter, I gave it my personal attention from time to time, and from reports taken from our books.

51. Q. Have you recently refreshed your recollection on the subject; and, if so, in what ways?

A. I have been examining the books and reports.

52. Q. Did the memoranda and reports to which you referred coincide, substantially, with your previous recollection?

A. Yes, sir.

53. Q. What, in your opinion, was the average amount of mending per day, under similar circumstances, on the Little Miami Road, while it continued to mend rails, during your connection with it?

A. The general average was about the same as that on the New York Central Road, from seventeen to twenty feet.

1257 54. Q. With what degree of confidence do you give your last answer and what are the grounds of such confidence?

A. From my own recollection of the work and from memorandums, or, in other words, note-books that I kept from time to time.

55. Q. Please explain what degree of attention, personal attention, you gave the subject of rail-mending while on that road?

A. The subject of rail-mending while I was on the Little Miami Road came under my personal observation and directions every day.

56. Q. During the time that you was master-mechanic on the New York Central Road, what knowledge did you have, actual observation, of rail-mending as carried on in its shops?

A. I visit those shops frequently, as frequently as three or four times a week.

57. Q. With what purpose?

A. For to get direct information with regard to the work going forward, as that was a portion of my business.

58. Q. What degree of personal attention did you give to the subject of rail-mending on the Ohio & Mississippi Railroad while you was connected with it; and what, in your judgment, was the average amount of mending per day on that, under circumstances similar to those specified in the question in regard to the New York Central?

A. Well, it run very nearly the same, at an average of from fifteen to twenty feet.

59. Q. What, so far as your observation goes, is the comparative advantage or benefit of rail-mending on the common anvil or on the jaws?

A. Well, I don't consider that the jaws have any particular advantage except you can work a poorer class of help. It enables them to do the work with less skill, while the common anvil would need first-class workmen; but I think you can do better work, get a better weld, on the plain anvil.

1258 60. Q. What has been your experience as to the comparative usefulness of all the work done by the two methods?

A. My judgment has always been in favor of the plain block for mending rails.

Cross-examination by Mr. Curtis:

1. X Q. You were aware, Mr. Ham, that, after trying and abandoning the Cincinnati machine, as it was termed, or the machine described by you yesterday as having been got up for use on the Little Miami Road, that road subsequently purchased the right to use it on the road—the regular Cawood machine?

A. No, sir? I was not aware of that.

2. X Q. Were you not aware that after that abandonment of the use of the machine the Ohio and Mississippi Railroad used a jaw-machine, and have been sued for infringement of the patent?

A. No, sir; I was not aware of it.

3. X Q. You gave the average of mending rails on the Little Miami Road from your recollection and note-books which had memoranda in them. Where are those note-books?

A. At my house in Rochester.

4. X Q. You gave your recollection as to the average amount of weld while you were connected with the New York Central Road from books and reports. Where are those books and reports?

A. They are in possession of the New York Central Railroad at Rochester.

5. X Q. You made no attempt to furnish them here?

A. No, sir; but I had access to those books.

6. X Q. They show the facts, do they not?

A. Yes, sir.

7. X Q. They show the facts, not judgment?

A. They certainly show the facts as being taken from the foreman's reports from day to day.

1259 (The complainant objects to such portion of the testimony on the direct examination as gives his judgment as of the recollection drawn from reports and note-books which are not produced here.)

CHARLES T. HAM.

CHARLES WILSON.

1. Q. Please state your name, age, residence, and occupation.

A. Charles Wilson; age, 51; reside at Cleveland; present occupation, an officer of the Brotherhood of Locomotive Engineers, styled the Grand Chief Engineer of the Brotherhood of Engineers.

2. Q. Did you, or not, ever have any trade? and, if so, please state what it was.

A. During my life I have had several. I have worked at blacksmithing; commenced about the year 1840, and worked at that business until about 1853—thirteen years; then I went on to the road running an engine; went, perhaps, first into the machine-shops and worked at the machine-business quit a while, and then went on the road, running an engine, until

1865; then I was despatcher at Rochester, New York, for the New York Central Railroad Company, until 1868; since that I have given my whole time to the business of the office I hold.

3. Q. Where was your blacksmith business principally carried on?

A. I first commenced working for Bradley & Rice, at Worcester, Massachusetts; worked there several years. They were exclusively engaged as car-builders. I worked for Ruggles, Nourse & Mason, manufacturers of agricultural implements; left there in 1851, and went to Keene, New Hampshire, to work for the Cheshire Railroad Company. I don't give these dates positively, because I have only a general recollection in regard to them.

4. Q. Did you have charge of the blacksmith-shop of the Cheshire Railroad Company while you were there?

1260 A. I didn't of the shop until we commenced fixing rails; after that I had entire charge of the rail-shop.

5. Q. When did you commence mending railroad-bars upon that road?

A. I should think in the latter part of 1852.

6. Q. Was that, so far as your knowledge goes, the first attempt at mending rails there or in New England?

A. Yes, sir.

7. Q. How, and with what sort of appliances, did you mend the first rails on that road?

A. We done them on the shop-tools, such as I had.

8. Q. Please go on and state from that point what subsequently occurred in respect to the rail-mending business in that shop.

A. The first intimation we had about mending rails, Mr. Thatcher, the president of the road, came into the shop and told me he had heard some reports about mending rails on western roads, and asked me if I could fix some appliance for that purpose. I told him we could. We had quite a long conversation as to the rails to be repaired, and we went right on and fixed the things up, and went regularly to work. We put a shop building right along the side of a long side-track, where the rails could be unloaded close to the side of the shop. After we got the building up, and the shop fixed up, and the tools to work with, we went to work and made a regular business of it. After we got our shop and tools ready we worked along a while with one fire, and that not doing the work fast enough, we added more fires, until, when I left there, I think they had four.

9. Q. What was the description of the anvil-block that was used there?

A. I gave Mr. Thatcher, who owned a large foundry, an idea of what I wanted—a flat surface, two feet square, with a hole in it wide enough to put in a swage; about the thickness I did not specify particularly. I think he made the thing about two feet thick, pretty nearly square, with a hole in the side for the purpose of putting in a swage.

1261 10. Q. What use did you make of that swage in repairing rails?

A. We heated the rail and put on a piece and hammered it a little, then turned the rail side-wise into the swage and hammered it along the thick edge; the swage fitted the neck and kept it in proper shape; after we got everything welded on we took the swage, and finished it off on the edge in a more workmanlike manner.

11. Q. What was the number of men employed at one fire?

A. Three men—a foreman and two helpers.

12. Q. What contrivance did you have for handling the rails?

A. I had the shop arranged near the road, at a long side track, where the trains could be switched in and unloaded from there to wooden

building. We had doors wide enough to let the rails in, as wide as they were long. I think we didn't have rails more than eighteen feet, perhaps twenty-one feet, and we had ways made so that they slid the rails off the cars on to these ways and run them right along up close to the shop. Overhead in the shop we had timbers that run along the lines of the fire, and a block or pully that run on the top or sheaves, and we had a hook, (some used a chain, but I liked a hook better.) We used a hook which we put right around the bar, and all we had to do was to hoist the bar right in, and with a small pulley, when we got it heated, it was swung into its place, and after the rail was completed, we just put it on to the ways and gave it a shove, and it went right out.

4. Q. What kind of fuel did you use?

A. Lehigh coal, or anthracite coal.

5. Q. How long did you continue in that shop, whilst they were mending rails?

A. Probably about two years.

6. Q. Did you work at this business yourself?

A. I did.

1262 7. Q. What was the extent of the damage on rails as they came to the shop for repairs?

A. At that time, the class of rails on that road were battered down at the ends, and didn't run far back from the ends; they were using short chairs, and the joints were the weak points, and the rails were only battered just on the point; the rails that we mended probably didn't average more than about six inches on the end.

8. Q. What would be the range, the lowest and the highest, according to your recollection, of the damage?

A. Probably we didn't put on any patches less than two inches; some would be a foot; my idea was, that economy for the company was not to mend them very far from the end; the reason was, that rails being mended in the middle it made a stiff place, and the engineers complained about the track, that it didn't run well. My idea always has been, not to patch them more than the six inches in the chair, where it would not make any difference, and would run just as well.

9. Q. As a locomotive-engineer, have you ever noticed any difficulties in running over rails mended in the center?

A. I have so much objection to them that they were not mended there to any extent on the New York Central; the rails mended in the center would not be put in the main track, but into siding and yards.

10. Q. Were the rails which came into your shop at Keene such as required patches upon both ends?

A. I should say rather more than one-half; it may not be so many where the rail was battered down so that it made an imperfection, that the construction train would pick up and bring into the shop.

11. Q. What, in your judgment, was the average mend per rail, as the rails run upon that road, whilst you had charge of that shop?

A. I have already stated about six inches.

12. Q. Do you confine that to one end or both—how much per rail?

1263 A. That would be about a foot per rail.

13. Q. How many rails of that character do you regard as a fair day's work in the shop?

A. Well, I think we used to fix twenty rails in a day; average about that; I would not be positive in regard to that point, because we didn't do it by the job; we worked by the day; some days we done more and

some days less. My impression is, that after we got fixed, we mended twenty rails, forty ends in a day.

14. Q. What would be the difference in time required to put on a patch two inches long or one six inches long?

A. Very little.

15. Q. Explain why.

A. Because there we had the capacity for heating eight inches in length as well as two. I could weld on a patch six inches long just as well as I could two; not quite as quick, as far as blows given, but we had to do it quick enough to have it weld any way.

16. Q. When the rail was there at the fire, what was your method of putting on the patch?

A. The rail was put in the fire and heated up to a red heat; then taken out, and loose particles cut off. My practice has always been to take what we called a fuller, set the iron back just where we began to mend, raise a bunch right up there—that makes what we call a heel to work upon—then get a welding heat, take it out on the block, weld on the length of piece that we want to weld, and turn it on the side and weld the edges; then take the chisel and trim off the edges; turn it first one way, then the other, and side swage it off. I always used to smooth it off around the edges before I threw out the rail; always had a chair right there to see if it went on freely and all right.

17. Q. If the chair didn't fit exactly, what did you do?

A. Simply put on the swage and strike a blow or two so as to remove the imperfection.

18. Q. What kind of blows do you employ in welding two pieces of iron?

1264 A. If the iron was properly heated I would not attempt to use very heavy blows at first, as it would have a tendency to make it fly apart; some of this Swedish iron that we used might fly all to pieces; we usually used a small hammer.

19. Q. What is the condition of iron when brought to a proper welding heat?

A. I could not give it in temperature; it is at such a temperature as will give it a kind of waxen look, just a little below a melting heat.

20. Q. What effect would heavy blows have upon the iron you used?

A. With the kind of iron we used, this Swedish iron, under heavy blows it might break in pieces and fly all over the shop; and even if the iron is heated to the proper degree, so as to make a complete and permanent weld, it would be better to hammer lightly at the start; light blows make a better weld.

21. Q. What was the dimensions of the iron that you used for patching rails?

A. We usually had three thicknesses of iron, 2 by $\frac{1}{2}$ inches, 2 by $\frac{5}{8}$, $2\frac{1}{4}$ by $\frac{1}{2}$ or $\frac{5}{8}$.

22. Q. What was it that the thickness of the iron depended on?

A. On the amount of iron that was broken down.

23. Q. Did you at any time have any observation of mending railroad bars by the use of the jaws?

A. I did.

24. Q. State the circumstances under which you made your observation.

A. After we had been at work at Keene for quite a time, at all events, the business was new there; many of the leading men from other roads came to see what we were doing, and how we got along with the business, and most of them put up shops substantially the same as what we were

using. We heard that they had an improvement on the Vermont & Massachusetts Railroad, where they were mending on a block
1265 that operated with a movable jaw, and I went down to see how they were getting along. A large, stout man was working there with the block; he knew who I was; that I belonged to another road; he took a heat and welded a piece on to the top of a bar, but I noticed that the edges were not well fastened down, and I made the remark, "that wouldn't do me;" he knew what I was looking at, and we had a conversation; he talked that it was not so important to weld the edges as the top. I told him that was the most important part; that the tread of the rail would not bear trains in that way. The movable block did not meet my ideas at all. I did not think it was of any use in any respect, and so I reported.

25. Q. Will you please give your reasons for not regarding this jaw-block as desirable in rail-mending?

A. The main objection will be as I have already stated—is that the jaw comes so near to the edge of the rail, which is the part where you want the best heat, and, being cold, it has a tendency to chill the rail so that it will not weld well; and if you put the rail in the jaws to weld it don't admit of its being turned to finish it as I always did mine.

26. Q. The result is that in your judgment it is of no value.

A. Yes, sir; but either way the furnace must be laid up so as to get a very good heat. So far as welding is concerned the quicker you get at it the better, simply to take the rail and hammer it out. In this work that I saw done it took too long for the man to get the rail into the jaws. I would have had my patch on before he had struck a blow. That is one of the objections. It takes a point of time to do it when you want it to be done in the least time.

27. Q. Would any machine that consumed time in that way be desirable in the mending of rails?

A. It would not, because it is something about which, if it is well done, very much depends upon the time, and if you had to do it quick it would only be a detriment. Perhaps it would be as well to say
1266 here, if it is proper, my reasons for stating that the heavy blows produced the effect spoken of. In the large rolling-mills, where they are rolling iron for track, in this city, you cannot weld by means of putting through the rollers. The weld is imperfect except you do it with hammers, and they practice piling the iron, heating it, then hammering it before going to the rollers. That is one reason. Hammers do a better class of welding than any other means yet invented.

28. Q. From your experience and observation what would be your judgment of the comparative amount of rail-mending with jaws and without, and of the comparative value of the work done?

(Complainant objects to the question on the ground that the witness testifies that he has never mended rails at all on a jaw-block, and as incompetent.)

A. I could answer only by giving my judgment on the thing in regard to what I have practiced; using the jaws I could not answer.

(Question read to witness.)

A. My answer to the first is: you could not do any more work on the jaws than without them, and that the work would not be near as good after it was done.

29. Q. In this rail-mending, which you saw in the Fitchburg shops, could you tell, by the appearance of the iron, whether it was at a proper welding-heat at the time the blows were being applied to it?

A. I could.

30. Q. What was its condition?

A. The condition is such that the experienced blacksmith will see that this waxen state is gone and it would not weld. We can tell just as well before you try it as you can afterwards.

31. Q. In welding patches upon rails—in all weldings—what is the material thing to be regarded by the smith?

1267 A. To judge by his eye when it is in the right condition; there is nothing else to go by to see when it is in the right state to weld. It must be clean, in the first place, with no scales on it, and then to tell the right degree of heat to weld well.

32. Q. Some witnesses who have been examined in this case, reporting to be engaged in rail-mending at the shops in Keene which you have referred to, have said that they mended only seven or eight feet a day at one fire; how would you account for that, if such was the fact?

A. Well, after I had arranged the shop the class of workmen left to work there were unskilled workmen—men that had never had any experience in the business except working as helpers; then it depended on the condition of the rail and the length of the mend, about making a day's work in feet, and it would depend on the length of the mend, if they were to fix only six or eight inches; but if they did more, so as to have to weld twice, it would take more time to mend a rail; if they fix nine or ten inches, and had to fix the web, it would make a difference.

33. Q. Taking rails requiring either to be cut off or welded, or both, with patches to the extent of eight or ten inches, what, in your judgment, from your own experience, would be a fair day's work in number of rails, and number of feet and inches of mend?

A. Take rails that would not run to exceed a foot, then as they usually do, battered on the end, I think, with common skilled workmen twenty rails; forty ends in a day could be mended with a Lehigh fire; that is for an open fire in heating them.

34. Q. It has been claimed in course of this testimony, by some of the witnesses that use the jaws for mending iron, that the jaws become heated so as to preserve the temperature of the rail; what effect would that have?

A. It would not affect it much; it would affect it somewhat, as I have already told you, notwithstanding; it would not cool it so rapidly, yet it would be still so much cooler than iron hot enough to weld that it would reduce it very rapidly.

35. Q. What is the difference between the welding heat and the temperature of the heated jaws?

1268 A. It would be immense.

36. Q. What would you say in regard to the reasonableness and practicability of a day's work of a competent blacksmith with two helpers, at one fire, mending on the common anvil sixteen rails a day, averaging fifteen or sixteen inches to the rail, would that or would it not be called a day's work; what would you say about its reasonableness?

A. Do you mean taking both ends?

37. Q. Taking the rails wherever patches might be needed; sixteen rails a day, with an average patching to the extent of fifteen or sixteen inches to a rail?

A. I should ask if you mend at both ends, or if you mend in one place?

38. Q. But taking the rails as they would come from the track for repairing altogether?

A. I should think it could be done without difficulty.

39. Q. Could you do that?

A. I could.

40. Q. Would you have any difficulty in doing it?

A. I think not.

41. Q. Do you answer that from your own practice and experience in mending rails?

A. From nothing else.

42. Q. Has your experience and observation been sufficient to enable you to answer understandingly?

A. I think it has; I have been familiar with the work for twenty years.

Cross-examination by Mr. Curtis:

1. X Q. Your conveniences and facilities for handling iron, getting it to the furnace and on the anvil, are as complete as any place you know of?

A. Yes, I think so.

2. X Q. Were they not more complete?

1269 A. No, sir; because roads there in that country fixed up substantially the same arrangements.

3. X Q. Yours exceeded them somewhat, did it not?

A. No, sir.

4. X Q. Will you swear that you ever put on in your life two hundred and forty inches of mend on the common anvil, at one fire, with two helpers? If so, state when and the circumstances by which you were enabled to know the precise amount.

A. Did you state one hundred and forty inches?

5. X Q. Two hundred and forty, that would make twenty feet.

A. It is my impression we did.

6. X Q. Will you swear you ever did it?

A. I won't swear positively that we did, sir; it is my best recollection of the times I was there, we did do it.

7. X Q. Did you keep an account of the number of inches welded?

A. I did not.

8. X Q. When did you leave Keene?

A. In April, 1855.

9. X Q. When was it you saw Mr. Whitcombe's block, having jaws on it?

A. I think I reported it in 1852; I could not state any precise date, only it was after we had been working at our rails.

10. X Q. What was the length of the jaw?

A. Probably twenty inches; about that.

11. X Q. How many rails did you ever, yourself, as a blacksmith, patch on any machine having jaws?

A. Not any.

Redirect examination by Mr. Jewett:

43. Q. You have been asked on the cross-examination as to the
1270 actual fact of your having put on two hundred and forty inches of mend, and the circumstances of yourself, the number of men, on the smooth anvil. I will ask you if you would be willing to do that work yourself, using the common anvil and two helpers, in a day's work of ten hours?

A. That proposes that I should do the work, which I am not in a condition to do; I would not be willing to go to work at it now. If you ask me if I think I could do it, after I got seasoned to work and in condition to do it, I answer I could.

Recross-examination by Mr. Curtis:

12. X Q. What wages would you want to average two hundred and forty inches a day on the common anvil?

A. When I worked at Bradley & Rice's shops by the job, my brother and myself earned ten dollars where they paid the other men two dollars and two dollars and twenty-five.

Redirect resumed by Judge Niles:

44. Q. State whether or not, in your judgment, any other skilled and competent blacksmith, an able-bodied man, could accomplish an equal amount of work.

A. Just as much. I didn't understand that this was going into the testimony; I answer the question by saying that a skilled workman can make so much difference in the amount done; no kind of skilled workman can make so much difference as a blacksmith; if he continues to heat one rail while he is welding another he can keep at work all the time.

Recross resumed by Mr. Curtis:

13. X Q. How many fires would you have to heat rails in order to work in that way?

A. I don't care to have more than one.

14. X Q. Can you heat a rail in the furnace in the length of time it takes to weld on a patch?

A. I cannot.

1271 15. X Q. How many rails can you heat in one furnace?

A. We heated one. I have seen furnaces where they heated twelve or fifteen rails at a time; our plan was to put in one rail; we worked by day's work, and we didn't care about the quantity in feet so much; we didn't take any special pains about that.

CHARLES WILSON.

N. CORNELL.

1. Q. Please state your name, age, residence, and occupation.

A. N. Cornell; age, 54; residence, Dwight, Illinois; occupation, railroad.

2. Q. Have you ever been employed on the Chicago and Alton Railroad?

A. Yes, sir.

3. Q. When?

A. Well, from 1853 up to 1871—about 1871.

4. Q. Were you ever road-master; if so, how long?

A. I had two spells at it; some five or six years, I think.

5. Q. At what times?

A. Well, the first time I was road-master, it begun about 1853, and run about three years, or two and a half; I forget. The second time, I think, I commenced 1868. I think it was December, 1868. I was on the road two years and five or six months.

6. Q. During that time did you mend rails on a machine with jaws?

A. Yes, sir; the last time. You mean the last time?

7. Q. What length of patch per rail on an average did you put on?

A. The average in length?

8. Q. What was the average?

A. My best recollection is from five to six inches.

1272 9. Q. What were your instructions in that regard?

A. Well, I never had any particular instructions for a long time, only what I gave myself to the men that repaired.

10. Q. What were they?

A. In the first place I examined and kept track of the rails to see how they worked, and I found, if they put on too long a patch, it would scale off. I made up my mind it didn't pay to put on too long a patch, and I would not put on anything that would take more than one heat, and not more than eight or nine inches in one patch.

11. Q. These were the instructions you gave to the men under you?

A. Yes, sir.

12. Q. What did you say to them about the number of heats?

A. I told them never to take more than one heat. I considered that it didn't pay to put on long patches, as heating twice was likely to burn the rail.

13. Q. How long a patch could you weld on with one heat?

A. I don't know as I could tell. I didn't like very long patches; they didn't do as well.

14. Q. Taking patches at each end of the rail, how much, in your judgment, would they average?

A. You mean on each end of the rail?

15. Q. Yes; on any place where it was needed.

A. Each patch? Some were very short and some were long—eight or nine inches long.

16. Q. Taking the average.

A. I should average them about five or six inches to the rail; I think it would average about six inches. If we mended a rail between the ends we might put on from ten to eleven inches to the rail.

17. Q. What was included in the word "repair?"

1273 A. Any rails that went into the shop and came out, they were usually marked as repaired.

18. Q. Were they all repaired, in fact?

A. You mean all patched—something done to them; how do you mean?

19. Q. Were they all patched?

A. No, sir.

20. Q. What proportion of them should you say were repaired in the jaws?

A. It is pretty hard work to come at that.

21. Q. How many of them were cut off?

A. I have been thinking the thing over, and I was thinking the amount of rails cut off would be about one-fourth of the rails that came into the shop.

22. Q. About one-fourth of the whole number?

A. Yes, sir.

23. Q. Then you would say the whole number of rails returned as repaired were not repaired on the swage-block, would you?

A. That is my impression. It is a long time since I have given any attention to it. I don't think there is an exact account.

24. Q. How often were you in the repair-shop?

A. Some days I was in there every day, and sometimes I would not be in there for three or four days.

25. Q. Whose business was it to see that the men discharged their duties faithfully?

A. The road-master; they were all under his charge.

26. Q. How long were the longest patches that you were in the habit of putting on the rail?

A. Well, as I told you before, my instructions was at the time not to attempt to patch anything that needed more than one heat; I didn't think it paid to patch more than eight or nine inches; if the men got any longer I suppose they might.

27. Q. How much shorter patches would you put on?

1274 A. We would put on sometimes what we called a Dutchman.

28. Q. How long would the Dutchman be?

A. Three inches, perhaps.

29. Q. How many did you put on of that kind?

A. That principally comes by the rails running, what we term running in the chairs, which makes a short battered end to the rail, as we term it, and we put on a new piece.

30. Q. What proportion of the rails were of this character:

A. Indeed, I could not give a very accurate account of that.

31. Q. Taking the short and the long patches altogether, how much, in your judgment, would they average to the patch?

A. I formed an idea; I think it would be about five or six inches, taking the short ones and the long ones.

32. Q. Is that your present judgment?

A. Yes, sir.

Cross-examination by Mr. Curtis:

1. X Q. You gave instructions to your men to put on short patches, because you observed that long patches were liable to scale off, did you not?

A. Yes, sir.

2. X Q. Now about when did you give those instructions, as nearly as you can place it?

A. I think it was about six months after I went there; that would bring it somewhere in 1869. It was December, 1868, I think, and this would be along in the following spring. When I went there, there was a great amount of iron scattered over the road, which I picked up and repaired. I got considerable new iron in 1860 or '70, which was laid upon the road, and we cut off the old rails and put on new pieces.

3. X Q. What instructions did you give your men in regard to putting on the patches?

A. The patches was shortened then.

1275 4. X Q. After you gave those instructions, were they?

A. I could not say they were shortened, because the rails were getting worn—were getting used up. The rails that needed the least repairing were fixed up first, so as to get them back upon the track.

5. X Q. Did you ever measure the patches on any of the rails; and, if so, when?

A. Very little of these. If I went into the shop, and they were putting on too long patches, I would measure them, and tell them they must not make them so long.

6. X Q. This was after you observed about their scaling off?

A. Yes, sir.

7. X Q. Did you ever mend a rail yourself?

A. No, sir.

8. X Q. The patches you measured were the long patches, were they not?

A. Well, I measured the patches by examining them to see about how long they were, because I wanted them not to mend too long. I came in, and sort of run them over to see how they were mending.

9. X Q. Have you any accurate recollection of the length of the patches, only that estimated or measured by you?

A. I noticed some of their patches that were put on the side-track.

10. X Q. Did you measure them.

A. Yes, sir.

11. X Q. What did they measure?

A. Some four, some five, some six inches, some as high as nine inches.

12. X Q. Did you ever cut off rails unless part of the head was gone?

A. What part of the head?

13. X Q. All the head or tread of the rail.

1276 A. We didn't cut off unless a piece of the head of the rail was gone.

14. Q. Unless it was worn to that point so that it should be cut off; if the men cut off the rails, they exceeded your instructions?

A. They did when they needed too much mending.

15. X Q. Who were the blacksmiths who worked in your shop?

A. John McCormick, foreman.

16. X Q. How many fires did you have?

A. We run two; sometimes three; sometimes one.

17. X Q. How many rails did you usually get out in a day, mended?

A. I don't recollect that.

18. X Q. Did you ever straighten any rails in these shops except when there had been accidents upon the road?

A. Yes, sir; rails would be bent in other places.

19. X Q. Now, as nearly as you can say, how many rails do you think you have straightened in a day at one fire?

A. I could not give an actual account; sometimes there would be a number, and sometimes they would be cut off; they would be cutting off at one fire.

20. X Q. Sometimes they would come in to be straightened?

A. Yes, sir; sometimes they would be cut off or straightened, and sometimes we would put in new iron.

21. X Q. When carried off the track, it was those that had bad ends that were cut off?

A. Sometimes; that depends on how far it was broken; sometimes a train run off the track and bent them.

22. X Q. Did you have cars off the track often?

A. More often then than now.

23. X Q. Who paid the men employed in the shops mending rails?

A. The paymaster.

1277 24. X Q. Did you have anything to do with the wages paid them?

A. Yes; I made up the pay-roll.

25. X Q. How much were the men paid?

A. The foreman was paid, I think, four dollars a day. There was one blacksmith that was paid three dollars. The men were paid different prices. I think they were reduced to two dollars a day when I went there, and again to one dollar and seventy-five cents a day for the helpers.

27. X Q. How many men did you have at each fire mending rails?

A. Well, we were doing other work; I think there were three at a fire.

28. X Q. How much coal did you use?

A. I could not recollect. We used coke for mending rails. I turned over all the reports from the blacksmiths to the new road-master, and I have not seen them since.

29. X Q. When you left there you turned over all the accounts to your successor, and left them in his hands, did you?

A. Yes, sir; to John Tearney.

30. X Q. Tearney had in his hands, then, the reports showing the particulars about mending the rails, did he?

A. He has the blacksmith's reports. He wrote to me to get a report and make a copy, and send one to the chief engineer of the road. These papers are usually kept.

31. X Q. Did you have any books as road-master which would show the cost of mending rails?

A. No, sir; the reports taken would show the amount of iron.

32. X Q. You used these reports as they came in?

A. Yes, sir.

33. X Q. Do you recollect whether they show anything more than the number of rails?

A. I think they gave the number of rails; just the number.

1278 34. X Q. Did they calculate the number of rails in feet and inches?

A. I think it will. I had orders to keep the number of inches, if such repairs were made.

35. X Q. When you left the shops you turned over to Mr. Tearney's hands these reports?

A. I turned over the old papers. We usually put them in the pigeon-holes of the company's office, and I took them down and showed them to him, at the time he went there.

36. X Q. Did you keep any accounts which enables you to actually determine what portion of the rails were cut off, without being patched, and what were patched?

A. No, sir; the blacksmith returned so many rails repaired, so much iron, so many pounds of coke. I asked him how he made it out, and he said he lumped it off.

37. X Q. How many rails have you yourself ever measured?

A. Some of them at Dwight.

38. X Q. How many?

A. I suppose a dozen.

39. X Q. In the side track?

A. Yes, sir.

40. X Q. How far from the station at Dwight were these rails that you measured, as you have stated?

A. East, along the grain track, there was most of them. I took my cane and measured them; there was a hole in the cane that marked the place. Some of these little chinks were put in there; they measured about three or four inches, I should think. I made a mark on the cane "up to there" (indicating measured at the time) eleven and one-half inches.

41. X Q. What is the iron used in the rails you measured; was it the old T-rail or the fish-joint rail?

A. Some of them were the fish-joint, and some of them were the old T-rail.

42. X Q. Did you make or point any frogs at your shop?

1279 A. No; the shop was at Chenoa, where we mended the rails.

43. X Q. Did you live at Dwight while you were road-master on that road?

A. Yes, sir.

44. X Q. How far is it from Dwight to Chenoa?

A. I guess about 28 or 29 miles.

45. X Q. During the period you were road-master, from December, 1868, what kind of rails were they repairing, T-rails, or fish-joint rails?

A. Well, principally fish-joint rails, I believe.

46. X Q. Did you repair a good many rails at both ends, and some in the middle as well as at the ends?

A. Well, not very many.

47. X Q. Did you repair a good many at both ends?

A. We repaired a portion on both ends when they needed it.

48. X Q. Have you noticed in reference to the fish-plate rails whether or not more of them give out back of the plate than the T-rails?

A. Well, you mean in the old-fashioned chair?

49. X Q. Yes.

A. I think more of them give out with the chair than in the fish-plate. With the fish-joint rails a great many more of them are worn back from the ends.

50. X Q. More of them do. Does not that method of holding the rails with the fish-plate tend to keep the ends from working, and in such a way that they don't wear as much as the old T-rail at the end?

A. Yes, sir; the strip keeps it up, and makes a more continuous rail.

51. X Q. Now, didn't you mend a good many of the fish-joint rails in other places than at the ends?

A. We didn't mend very many. We did mend some at one time, but Mr. Booth and I was talking the thing over, and he said he did not think it paid to mend the rails in the middle.

1280 52. X Q. When was that?

A. Along during the first year.

53. X Q. Didn't you sometimes mend one end of the rail and cut off the other end?

A. Yes, sir.

54. X Q. You did that quite frequently?

A. Well, in the first it was quite a common thing; until the last we did it quite a good deal.

55. X Q. During the last part of the time you think you cut off quite a good many more?

A. Yes, sir.

56. X Q. What other men worked at Chenoa the last time you were road-master, at mending rails?

A. I think one's name was Fitzgerald. I do not remember the helper's name.

57. X Q. Are you quite certain that you ever measured any rails with the rule, and ascertained the length of the mend, before you measured this the other day with your cane?

A. Yes, sir; I am certain I did measuring off from the shop.

58. X Q. Can you tell now what a single one of them actually measured by the rule?

A. Well, I don't know; I measured some of them that went as high as eleven or twelve inches. Whenever I saw anything of that kind I called the blacksmith's attention to it, and told him not to make so long a patch.

Redirect examination by Mr. Payson:

30. Q. I understand you to say that the fish-plate rail was worn less at the end than the chair-rail?

A. I could not say it wears better; I don't think it wears better; still, the end does not wear so fast.

31. Q. I am not speaking of the character of the iron used, but of the wear of the different rails.

1281 A. It wears more evenly.

32. Q. How many patches do you usually put on a rail, on the average?

A. Sometimes not more than one, sometimes two; occasionally they would get on three, but not many times.

33. Q. How many had only one patch on—what proportion?

A. That is a pretty hard thing to get at.

34. Q. I only ask you approximately—was it only a few, or was it a good many that had but one patch on?

A. If I should tell just about what I thought, I should say it didn't pay to patch.

35. Q. Is it usual for the rails to be battered at both ends?

A. Yes, it is very apt to be the case; if one rail commences to batter, it is apt to batter the end of the one next to it, and the end of each of the rails is battered.

36. Q. If one rail gives out, the adjoining rail also gives out often?

A. Yes, sir; that is, in the chair iron.

37. Q. Then a large number of the rails would be battered at one end and not at the other?

(Objected to as leading and withdrawn.)

38. Q. Suppose one end of one rail is battered, what effect has that upon the end of the adjoining rail?

A. I don't know; I don't understand you.

39. Q. I mean the end of the next rail, the——

A. That is what I said before; it is very likely to break out the end of the next rail.

40. Q. Then would that affect in any way the other two ends of the two rails?

A. I don't think that it would; I don't see how it would.

41. Q. You stated a few moments ago that the rails were as liable to have both ends battered as one?

A. I meant that if one is battered at the joint the other sometimes was.

1282 42. Q. You didn't mean that as many rails were battered at both ends as are at one end?

A. No, I didn't; I think there was more had one end battered than two ends.

43. Q. More that had one end than both?

A. Yes, sir.

44. Q. More than one-half had but one end battered?

A. I should think they would get about one-half in the second year of my work.

JOHN FLETCHER.

1. Q. Please state your name, age, residence, and occupation.

A. John Fletcher; residence, Ravenna, Portage Co., Ohio.

2. Q. State whether or not you are connected with the Pittsburgh, Fort Wayne & Chicago Railway; and, if so, in what capacity.

A. I am connected with the Pittsburgh, Fort Wayne & Chicago Railway, as road-master from Pittsburgh to Crestline.

3. Q. State, if you please, how long you have been in that position.

A. I have been nine years eight months and twenty-one days; that is, this is the twenty-first day.

4. Q. Then you came on the road when?

A. In 1864; the first day of April, 1864.

5. Q. State, if you please, what number of rails have been repaired on that division, by what is known as the Cawood swage-block, since that time.

A. None.

6. Q. State, if you please, how the repairing rails is done.

A. I never had any repairing done, so that I cannot tell. I have seen them on other roads, but could not tell anything about that; it does not belong here.

1283 7. Q. Who has charge of the blacksmith-shops on that division?

A. I have.

8. Q. Do you ever cut off rails?

A. No, sir, I never have, otherwise than the track-men, if they find any broken rails, cut them off and put in a piece; but in the shops I never have cut off any.

9. Q. You have charge of the maintenance of way on that division?

A. Yes, sir, it is my duty to look after the road in the shops; the maintenance of way department.

JOHN FLETCHER.

ROBERT Y. HUMPHREYS.

1. Q. Please state your name, age, residence, and occupation.

A. Robert Young Humphreys; age, sixty-seven; residence, Bellefontaine, Ind.; machinist by trade. Have been in charge of the shops at Bellefontaine for eleven years the first of April. Was working at Bellefontaine as machinist before.

2. Q. On what road?

A. At the time I was employed I was on the Bellefontaine & Indianapolis Railroad, what is since the C. C. and I. I could not state the time.

3. Q. During that time, what experience have you had in the mending of damaged rails?

A. Well, we have repaired a good many rails in that time, and I have had charge of it part of the time. They had three fires to do the repairing a part of the time. A part of the time one. I think never had three fires more than one season for repairing rails.

4. Q. During that time have you been in the habit, to some extent, of cutting off damaged ends, instead of repairing them and mending them, and of mending the web, as well as the crown or the head of the rail?

A. Yes, sir.

1284 5. Q. What kind of instruments have you used, blocks or other instruments?

A. Well, the Cawood patent. I am somewhat conversant with it in the shop. Some two or three years before I went into the shop, the man that invented this eccentric, as I call it, came to the Bellefontaine & Indianapolis Railroad, and set up a machine there. There was one in the shop. I took charge of it. We did not repair a great many on that. The road from Galion to Bellefontaine was in two divisions; one from Galion to Union, and from Union to Bellefontaine, one from Bellefontaine on the State line. I do not remember using the machine, but, perhaps, eighteen months before I had charge of the shops, the man that was foreman there got a pattern for the Cawood block, and the tools for repairing, and they made the tools, and repaired the iron.

6. Q. Did you, also, use the common grooved anvil block?

A. We did. I am not able to say how long. My recollection is, before I took charge of the repairing of the shop, we mended iron with the bellows and common anvil. After they had got the Cawood block I had a power-blast; it was got from some mill whose engine was near enough to run it and the power. That, I think, was in 1861, or in the spring of 1862; and they put up an engine in one corner of the shop, and built a

tube to convey the wind to the bellows, and had a sort of wooden pipe to run it through the building, and I know it was run to open fires in the shop. When they put in that pipe, I think, was the time we started three fires, although we were mending the T-rail. Then we worked on what was called the Whitcomb block, similar to that; (referring to the model marked "Cleveland vice," or "Whitcomb block;") that was sent down to Galion, and we put it up, and had three of these fires, I cannot state how long. We run them on the common block; could not state how many months it was.

7. Q. State, according to your best recollection, how long you operated with the Whitcomb jaw-machine, and the common groove anvil.

1285 A. I cannot state the number of months; we got the block to cast for a swage-block at the foundry in Bellefontaine for us to swage on, and the plain block for the common anvil. It may be, I think we did run it the second season; they sent a man there. I know we were running it when we got the man from Galion. I think it must have been fifteen or sixteen months before they sent these jaws; we put them on wood and fastened to the wood.

8. Q. With grooves?

A. Yes, sir; we made a wooden pattern. I had one made; they cast it from the blocks; and the groove for the swage was separate from the anvil, and was made from the pattern of the Cawood machine—the swage part of the Cawood machine or block; we had a Cawood pattern.

9. Q. Now state what, at the time, was and is your judgment when you were using the plain anvil and the jaws as to the best means of mending rails; how is your judgment as to the comparative value and efficiency of each method of mending rails? State fully your opinion, and the reasons for it.

A. Well, for a number of years back it has been my opinion that there was very little difference in the mending, but after we got to using the Whitcomb block I found the quality of work was better on the common anvil; but at the time we was using the common anvil and the Cawood machine, I never seen any difference in the quantity; but the Whitcomb block is a little more convenient to use, and there was a difference in working it. I think the iron mended on the common anvil was more serviceable though not quite so smooth—generally not quite so smooth.

10. Q. Was that your judgment and opinion from your observation at the time; and is it still your judgment?

A. It was formed at first when we commenced using the Cawood block. I do not think I had formed any judgment of the working of it until after I began using the Whitcomb block, and I found that the

1286 rails put in the track were scaled off from some cause, and it had never been so before when we were using the common anvil; and I came to the conclusion, after examining and investigating it, that they used the heavy swage before it was properly fluxed, and before it could unite, and I had them use little hammers before they put the heavy swage on.

11. Q. You state that in your opinion there was a slight advantage as to the amount of work done on the jaws as compared to the common anvil; what per cent., if any difference, was there?

A. That I could not state; the jaw done about the same number of bars; while we worked the Cawood block I think we never worked but one full day at mending rails. We had men working with the tools; they done some other work the balance of the day generally; sometimes they would be at work making or repairing tools.

12. Q. Were you making tools for any other work except repairing rails?

A. Yes, sir; considerably; we have had a wood train, a gravel train, and a construction train on the line, and have had to make their tools; but that day that I speak of when we worked on the common block and the Cawood block, the work was done on a kind of race between the two sets of men. They had been working for some time, and, as men will, had been bragging over each other, and they wanted me to let them try and run a race as they called it; wanted to see which would do the most work; my objection to it all along was that they would slight the work; but at last I gave them one day, and they worked against each other. I do not remember the number of inches. I measured them and I think they repaired thirty-four bars apiece. The Whitcomb block had a little the advantage; but they were both very rough. I think they must have repaired forty-five or fifty feet each, but it was mighty rough done.

13. Q. State as nearly as you can the number of inches repaired on the Whitcomb block more than on the common anvil.

1287 A. I could not; I just remember that there was a few inches in favor of that—a trifle; and I just told the men that had worked on the jaws, that they had the advantage in the number of inches, and I thought the other had done the best mending, and I thought it was about even. I think there was one man that worked for me at that time, that is at work for me now.

14. Q. Was the work so done as to leave the rails in fit condition to be put into the track?

A. They were put in the track.

15. Q. On what machine, in your judgment, was the work best done?

A. Well, I don't know as I can say, unless, as I stated, that I decided in favor of the common block at that time, and for quickness, in favor of the other. I was not testing the blocks, only testing the men. It was not the blocks that we wanted to test, it was the men, because they had been bragging, and it was the men that were testing their skill on the common block or the Cawood block.

16. Q. Was that your best judgment at that time?

A. It was at that time, and has been.

17. Q. Have you recently made any trial of the common anvil, or the smooth anvil, and the Whitcomb machine for any special purpose? If so, state what, and under what circumstances, and the result.

A. A week ago yesterday—last Friday—I received a letter; week before last I received a note from our chief engineer, Frank Ford, saying he wanted me to come to Cleveland. I didn't know for what purpose—nothing about it. I asked my road-master what he thought, and he said he did not know, and I went up on the night train. I think it was Thursday, and he asked me if I was able to test the machine, and he told me that Mr. Mason, attorney for this road, wanted to see me about my experience in repairing rails, and I went over to the office.

1288 When Mr. Mason first came in I was introduced to him. He at once opened the conversation, and asked about my experience, and I told him about what I had done, and said to him that from my recollection, my opinion was there was not much difference in the quantity—looking back over some eight or nine or ten years—and he told me that he wanted me to have the two sets of men repair rails, one of them on the Whitcomb block, and the other without the jaws. They done so, and I stood by and timed them, and measured the amount

of work done, and made a statement of it, giving the number of the inches done on each block, and in each way.

18. Q. Did the *the* men know anything of your purpose in the experiment?

A. They did not know anything about it in the least, until it was done. Then my foreman asked me, and I told him there was a suit pending for damages claimed for using that block, and I wanted to know what the difference was, so as to know whether our judgment was correct or not, and put it on trial.

19. Q. Did the men work in the same way upon each block?

A. Yes, sir; I think they worked with more energy than they would if they had not been working against each other.

20. Q. You think they worked faster, a little, on the Whitcomb block?

A. I could not see any difference in their work on the Whitcomb block or the common anvil.

21. Q. Now state the results of that experiment.

A. (Witness referred to the paper.) The first rail was repaired by the Whitcomb block, with a patch of nine and a half inches, in fifteen minutes; the other, with a mend of seven inches, in twelve minutes. The second rail was mended on the common anvil; the first mend of ten inches in eighteen minutes; the second mend of eight inches in fifteen minutes.

22. Q. How did the quality of the work compare?

A. Well, I have to say that there was very little difference in the quality; that mended on the Whitcomb block was a little smoother than that repaired by the common anvil, according to my mind, smoother and with less loss.

23. Q. How for solidity and durability of mend?

A. As I said before, I think the common block was the best. There was no time to compare the patches, only to notice whether the fluxing of the bar was as good. I should say this much: they were both pretty roughly worked. The amount put on by the Whitcomb machine was 30 feet $6\frac{2}{3}$ inches, and the common block 27 feet $3\frac{9}{33}$ inches. I pay five dollars seventy cents per day for that fire; that is two and a half for the blacksmith and one dollar sixty cents for each of the helpers.

24. Q. Have you been accustomed to cutting the ends of the rails off instead of patching them?

A. Yes, sir.

25. Q. Will you state the number of rails which are cut off, and not patched at all, as near as you can state it?

A. I cannot tell; there is no record of that of the rails coming in; there were more rails reported as repaired than there were actually repaired; because the rule was, where we cut off the ends of the rail, to report each as so many inches of patching, because they took so much time to heat and to cut them off.

26. Q. Have you had any lengthy experience in cutting rails?

A. We have had a good deal in cutting; it takes about the same time to cut off a rail as it does to repair and patch six or eight inches long. We can repair about as quick as we can cut off, and punch holes in the neck after the rail is cut off.

27. Q. Describe your method of cutting off the rails.

A. Well, they stick the rail in the fire until it is hot enough to cut off; we do not bring it to a welding-heat; then we put on the top block a piece of iron about two inches thick, and then bring the rail right across that piece and cut it off. We put that piece on so that when cutting through the rail, we need not cut on to the block; and the end of

the rail falls over that block out of our way, so that we can keep the chisel clear when cutting the rail. We tried to cut on the block
1290 without having this piece to keep the rail from the block, and we found that the end of the rail was in our way, and that the chisel would cut through on to the block.

28. Q. In cutting rails, have you ever been accustomed to use the jaws at all?

A. Never.

29. Q. Has the Whitcomb machine, for the purpose of cutting rails, in your judgment and according to your experience, any advantage whatever over the smooth anvil?

A. No.

30. Q. The work can be done just as well on the common anvil?

A. Yes, sir.

31. Q. With the common smooth anvil-block could you cut rails just as well as upon the Whitcomb block; and for that purpose did you use the Whitcomb block instead of the common smooth anvil?

A. In my opinion the Whitcomb block is not of much use for cutting rails; we used the smooth part of the block.

32. Q. You mean then to say you always cut your rails resting on the smooth part of the machine?

A. Yes, sir; we first commenced cutting them on the smooth surface, for I could not see how it could be done in the jaws without injuring the machine, by hacking it up with the chisel; and we quit using the plain surface, and put this piece of iron on it, for the purpose of relieving the end of the rail, so that it would bend over when it was being cut off, and the end would drop over out of the way.

33. Q. Where have you to cut them off, if you do not place them inside the jaws to be cut?

A. We could not cut them in there, in my judgment.

34. Q. Is there any difficulty in cutting the rails on the flat of the anvil when placed there in the manner described by you?

A. No, sir; I suppose we could cut off ten or twelve feet just as well as we could a quarter of an inch.

1291 Cross-examination by Mr. Curtis:

1. X. Q. I understand you to say that you cut on the Whitcomb block; was it because you had no other block to cut on—you had no other place for cutting?

A. No, sir.

2. X Q. Where did you speak of cutting, at the shops in Bellefontaine?

A. Yes, sir.

3. X Q. Do you know William Sheard?

A. Yes, sir.

4. X Q. What has been his connection with your road?

A. He worked in that shop awhile; I do not know how long before I took charge of it; he worked there awhile after it, and went to Anderson to take charge of the Anderson shop.

5. X Q. He was foreman of the T-rail shop in Anderson, was he?

A. Yes, sir.

6. X Q. He had charge of that?

A. Yes, sir; and he had charge of the shop at Union; and he went to Union, first from Bellefontaine, then from there to Anderson.

7. X Q. Then to Indianapolis?

A. No; he died at Anderson; he never worked at Indianapolis, unless it would be a day or so; I do not think he did.

8. X Q. Has he never worked at any shop, except at Union and Bellefontaine?

A. No, never for that road; he was working for the company when he died.

9. X Q. Where was it that you made this experiment about rails the other day?

A. At Bellefontaine, yesterday a week ago.

10. X Q. Were you present, Mr. Humphreys, in the shop at Bellefontaine?

1292 A. Yes, sir; I have charge of the men in the shop, and have had so for over eleven years, and am assistant road-master and kind of supply-agent. I have charge of the wrecking-car, and the repairing of the wrecking tools, and have to make them when needed; and do business for Mr. Wright; in approving bills if he is not there, and other charge of the shop; see that the time is kept, and make out the pay-rolls.

11. X Q. Were you there on that road in Bellefontaine in '57?

A. No, sir.

12. X Q. You do not know whether that was the period in which they got the Cawood machine or not?

A. No, I do not think it was then; I think it was about two years before, and may be more, before I took charge of the shop; I know it was a good while.

13. X Q. Before you were in charge of this shop they worked on the common anvil with the Cawood machine?

A. No; I have no knowledge of what they done before I took charge of the shop.

14. X Q. If I clearly understand your testimony, it was substantially this: you used the common anvil there; then procured the Cawood machine, and used that for a brief period, and then used the common anvil again, and then procured the Cawood machine or Whitcomb block, and threw out the common anvil, and have never used anything but the Whitcomb machine since?

A. Yes, sir; that is what I have stated.

15. X Q. How many years is it since the race between the men working on the Whitcomb machine and the common anvil?

A. Well, I cannot state positively; I expect about nine or ten years ago. I am not able to say whether it was within one or two years' time after I took charge of the shop.

16. X Q. That was a test of the men, and not of the machines?

1293 A. Yes, sir; it was a test of the men, because they were bragging with one another.

17. X Q. Do you recollect how many inches across the jaws that Cawood machine was?

A. I do not.

18. X Q. Was it about sixteen or eighteen inches, more or less?

A. Sixteen or eighteen inches, I should judge.

19. X Q. Do you know what the width of the jaws of the Whitcomb machine was yourself?

A. No; I do not know exactly.

20. X Q. About what?

A. I think they were about eighteen inches. I should judge, from shutting my eyes and guessing at it, it would be in the neighborhood of twenty inches; probably a little more than that. I was going to state one thing that no question has been asked upon. I do not think it was

asked me whether the Cawood mahine was used with an open fire. The common anvil was used with a furnace-fire.

21. X Q. You did not use the Cawood machine with a furnace?

A. It was used with a blast, but we were using the open fire with a common anvil, and the Whitcomb block with a furnace.

22. X Q. Is Mr. Sheard a pretty good blacksmith?

A. Yes, sir.

23. X Q. He understood it, did he?

A. He was a pretty fair blacksmith.

Redirect examination by Mr. Jewett:

1. Q. How did the two sets of men—the one working on the common anvil, the other with the jaws, on the day you have mentioned as a kind of trial between them, compare as to skill and capacity for doing such work?

1294 A. Well, the men that worked on the common anvil—at least foreman—I am not able to say now really; one of the helpers had helped on the Cawood block, when it was used, until he took charge of one fire himself. I put him in charge of a fire, and he had worked probably a year or eighteen months before this test—before they raced, as they called it—to see who would do the most work. The other blacksmith had come from Galion; was considered a pretty good blacksmith. When Sheard left he came there, and had been repairing every day a few rails in the intervals between that and other work. He had had no experience in the rail business until he came there. I do not know how long he had been at work; I think several months.

2. Q. Were they equally competent?

A. I could not see much difference. Mr. McMahon could do more work now than he could then, because he has had more experience since. The other man has not been there for some time; I do not know where he is.

(Signature waived by consent of counsel.)

JOHN B. JERVIS.

1. Q. Please state your name, age, residence, and occupation.

A. John B. Jervis; 77 years of age; residence, Rome, N. Y.; occupation, civil engineer.

2. Q. For how many years have you been engaged as civil engineer?

A. Well, with very little interruption, I have been engaged in that occupation since 1818.

3. Q. Upon what railroads in the country?

A. I was first on the Carbondale Railroad, a coal-road in Pennsylvania; next, the Housatonic; then the Saratoga & Schenectady. Then I had no charge of railroads until I took charge of the Hudson River Railroad. I was in charge of that, and then I had charge of the Michigan

1295 Southern and Northern Indiana Railroad, and of the Chicago & Rock Island, as president of the road. I was not engineer of the road. I believe that is all the railroads. I forgot to state that I was in charge of the Pittsburgh, Fort Wayne and Chicago Railway, first as a general superintendent, then as chief engineer, then as consulting engineer.

4. Q. During what years were you chief engineer of the *the* Pittsburgh, Fort Wayne & Chicago Railway Company?

A. I was chief engineer during the year 1864; my superintendency of that road closed in March.

4. Q. How long were you superintendent?

A. About two years and one-third. My superintendency began in December, 1861, and closed in March, 1864.

5. Q. Are you now connected with the road?

A. I am consulting engineer of the old Pittsburgh & Fort Wayne Company.

6. Q. Here are the reports of the Pittsburgh, Fort Wayne & Chicago Railway Company for the years 1862, 1863, and 1864. State, if you please, what you know about them.

A. In the report for 1862, and also the one for 1863—there is a report of mine in each of those as general superintendent; for 1864 I suppose there is a report of mine as chief engineer.

7. Q. In the reports of the road for 1865, 1866, and 1867 are there any reports of yours? (Copies handed witness.)

A. Well, sir, I rather think I made a report for 1865. (Referring to printed copies of reports.) Yes, sir; I made a report in 1865 as consulting engineer.

8. Q. Did you make any in 1866, sir?

A. Yes, sir; I did. I made a report for the year 1866, for 1865 and 1866; it is as consulting engineer.

9. Q. Did you make any in 1867? (Report handed witness.)

A. I think not, sir. No, sir; I made no report of an annual character. I recollect of making a special report of a matter connected with the road.

1296 10. Q. Who succeeded you as general superintendent of the road?

A. Mr. McCulloch, J. N.

11. Q. Who succeeded you as chief engineer?

A. Mr. Gardiner; Henry J. Gardiner.

12. Q. Will you state, Mr. Jervis, how the reports of the superintendent or chief engineer were made up so far as the details with reference to the roadway was concerned?

A. The reports of the superintendent would embraces the details of the "maintenance of way"—the road, and the repair of rails and track. The engineer's business was entirely to direct making new work, and not connected with track operations; that the report of the superintendent would embrace.

13. Q. What items are contained in the items "maintenance of way," "iron-rails?" Would the superintendent have these items? By whom were they furnished?

A. The items "maintenance of way" are furnished by the division superintendents and supervisors and track-master's accounts with the company. For instance, the "maintenance of way" embraces a number of items—"rails," "chairs," "splices"; and the work of changing rails and track would come under that head—"maintenance of way."

14. Q. What would the mending of iron rails—under what head would that come?

A. In that account.

15. Q. The "maintenance of way" account?

A. In the "maintenance of way" account.

16. Q. Can you tell from an examination of these reports what number of rails were repaired for any given time or by what process?

A. What number of rails?

17. Q. Yes, or by what process?

A. I don't think there was any account kept of the number of
1297 rails by the men. I suppose they are included in the matter, but not in detail. The repair of rails was put in the reports as mended

rails—so many miles in the aggregate. The number of rails I don't think were ever reported.

18. Q. Can you, from the number of miles, tell the number of rails by any calculation?

A. The number of rails in a mile?

19. Q. No, sir; the number of rails repaired.

A. No, sir; I don't know that there is any way to tell the rails; the report includes the length in the aggregate; of course, I could not tell about the number of rails in a mile.

20. Q. Can any one else tell by calculation?

A. Not by the simple fact of knowing the number of miles; you cannot tell the number of rails unless you count the rails.

21. Q. What is the variance in the length of rails used?

A. The rails vary in length very much; the maximum was eighteen feet; they gradually increased to twenty-one feet, and they have got up to thirty feet. It is usual in contracting for rails, on the part of the manufacturer, to have the privilege of having a number of rails shorter than the most of his contract. I don't recollect how it is since the eighteen-feet rail was running. Previous to that, the contract was made to allow the rails manufactured eighteen feet long a certain proportion made two feet and three feet or four feet shorter. I doubt if there is more difference now, although the rails are longer, being now usually thirty feet; but I have not been conversant with the matter very lately; when I have had anything to do with it, it has always been considered that the manufacturer must have a certain latitude in making rails; sometimes the bar don't come out perfect, and they have to cut it off; and if they are compelled to furnish all the rails a certain length they would lose these.

22. Q. In repairing rails for use on that road while you were in charge, what proportion of the rails were cut off?

1298 A. Well, really, I could not tell what proportion; I could not tell that. The way we operated the thing, generally, in taking out a rail that we considered unfit to be in the track longer, if it was badly worn, and if the material was good and we thought something might be made out of it by repairing it, we sent it to the shop to be mended; if the end of the rail was bad they cut it off, and if we could not do anything satisfactory in that way it was sent to the rolling-mill to be rerolled. If they were very badly battered at the end, sometimes they were cut off, so that they didn't require any additional attention. There were various ways of managing rails in that situation.

23. Q. Under this head of "maintenance of way" would that all be included?

A. Yes, sir.

24. Q. Was there any account made of rerolling and repairing rails separately?

A. Everything connected with new rails or rerolling rails went into "maintenance of way."

25. Q. Was your attention ever specially called to this Cawood patent while you were on the road?

A. It was not until about the time I left the superintendency of the road that I heard of any such patent. I had never heard it spoken of by anybody claiming the patent. While I was superintendent of the road no claim was made for it. It was only in the way of consultation that I ever understood that there was a patent about it.

26. Q. Then, of course, you are personally unable to state whether the repairing was done on the common anvil or the Cawood patent?

A. I don't think I could tell, although I think there was a patent of some sort of thing, different from the common swage-block, which made the process a little different from the old way of mending the rail.

27. Q. Have you ever given any orders with regard to keeping an account of the different ways in which rails were mended?

1299 A. I don't think I ever did; I don't think I ever made any comparison of the ordinary kind of working on an anvil and this patent. I used to ask and get information from the supervisors at the time, I recollect, for the purpose of getting information for my own government, but I cannot recollect all the particulars, whether the statements contained the account of the work or not.

28. Q. The gross cost of doing this work was given?

A. The gross cost was there.

29. Q. Then I understand you to say that *that* there was no order issued to account for the different ways of mending rails?

A. No, I don't recollect anything of the kind. My own impression was that they were mending rails as a sort of make-shift—temporarily—a very little patching was the most that we repaired. Rails that needed to be patched in three or four places we did not make use of, except to send to the rolling-mill.

30. Q. If you were required to state how many rails were mended on the Cawood machine while you were in charge of the road as general superintendent or chief engineer, how would you do it?

A. I don't think it could be done at all; you might find the whole quantity; but as they were laid in different places, I don't think it could be possibly ascertained how many were mended with that machine.

31. Q. Would it be safe either to average the number of rails or to average the cost of mending on that machine?

A. From an average price?

32. Q. Can you, by any process, or from the number of miles of mending, arrive, with any degree of certainty, at the number of rails repaired on the Cawood machine?

A. I don't know of any way that it could be done. This repairing rails don't mean repairing the whole rail; it is a piece of the rail, because where the rails required to be mended between the ends we generally threw them out.

1300 33. Q. I understand you to say that you don't know what proportion of the rails were cut off?

A. No, sir; I could not tell that; I could not say; there was a good many of them cut off; I could not tell the proportion.

34. Q. You have already said that you didn't think it possible, from this data, to tell what proportion of the rails were rerolled?

A. I always had all the rails rerolled that were not in good condition. I should say, perhaps, that in taking care of a railway, there is a good many places where you cannot take particular notice of them. If the railway is in such a condition that the iron will bear mending, and iron is high, there is a strong inducement to do repairing, when the rails will bear taking up.

35. Q. You regard rail-mending as a sort of make-shift, do you?

A. Very much that way. I want you to understand that in the management of a railroad you have got places where the rails are bad and not fit to be in the track. You have either to get new rails, or to mend and put down old ones.

Cross-examination by Mr. Curtis:

1. X Q. You say that from the number of miles of rails repaired it

would not be possible to ascertain the number of rails repaired. Suppose the number of miles repaired to be divided by the longest rail mended, or on the basis of the longest the testimony showed to be in use upon the road at the time in question, would not the results that follow—the result obtained, while not being exactly accurate, would show a less number of rails than might have been mended, or than was really mended?

A. There is no difficulty in dividing five thousand two hundred and eighty feet by an assumed number.

1301 2. X Q. Yes; but if you assume the number to be the length of the longest rail used upon the road in question, it cannot be too great a number of rails repaired.

A. No, sir; if you take the maximum length of rail and consider that the length of rail, of course you can tell how many rails were repaired on that basis.

3. X Q. Suppose also you have the number of shops where work was done, and the length of time during which work was carried on there, and the average work done in those shops per day, would it not be possible to arrive pretty closely at the number of rails repaired?

A. I should think it would be pretty difficult, because the length of mend on the rail is variable; sometimes three inches, sometimess six inches, and from that to nine inches.

4. X Q. My question does not relate to the number of feet, but simply to the number of rails. Suppose a witness testifies that the average number of rails mended at one fire is fourteen per day, and you know how many fires were at work and how many days' work had been done, would it not be possible to arrive at the number of rails pretty closely?

A. Well, if you had anything that would give you an average quantity in regard to the work that was done in a certain day, if that could be settled upon, the principle that there was an average amount of work produced, we might find a certain number of rails; if the data supplied was correct you might make it out, but I don't see how, from any amount of work done, you could get at it, unless you had a specific account of the work kept. I don't know how it could be done, unless you kept an account of the rails, number of days they worked, and where you have an average from that data you might reach some conclusion. I am speaking of the number of rails; taking these reports it would be competent evidence if the rails were laid continuously, but they are laid one or two or more in a place and of different lengths; admit that the length was known at the time, they are scattered about everywhere along the line.

1302 5. X Q. Can you not tell a rail that has been scarfed and mended, years afterwards?

A. Well, sir, I don't believe any of these rails last two years. I don't suppose that the rails that were repaired on the road in '62 and '63 are now left on the road. I have not the least idea that there is one of them left.

6. X Q. You have changed the iron on the road, changed to the fish-plate rail within a few years?

A. The iron has been changed. The fish-plate rail was not put down till after I left the road.

7. X Q. You don't know whether the rails that were repaired on the swage-block were brought to your notice particularly?

A. I don't recollect; I think such a thing might be.

8. X Q. Was your observation very close and critical, or only general?

A. I could not say my attention was very particularly given to this matter; my business, to a great extent, occupied my mind in other directions, yet I made it a point to go into the shops and see how they were working. I cannot say they were repairing rails exactly at that time.

9. X Q. Nor can you say, I suppose, with any attempt at accuracy, what was the average wear of a repaired rail?

A. I don't know as I could. I don't think my knowledge accurate enough to warrant me in saying definitely on that subject.

10. X Q. There are people connected with the Pittsburgh, Fort Wayne & Chicago Railway Company, I mean prior to the lease of the road to the present company, who possess a more intimate knowledge on the subject than you do, are there not?

A. Very likely.

Redirect examination by Mr. Roberts:

1303 36. Q. If even the number of rails mended could be ascertained, as suggested by the complainant's counsel, would it necessarily follow that they were repaired on the Caywood machine?

A. I don't suppose it would. I don't know why it should.

Recross-examination by Mr. Curtis:

11. X Q. Is the model now shown you, marked Cleveland vise, or Whitcombe machine, substantially the machine that you remember to have seen in use on your road?

A. I cannot recollect anything about that machine, except that it was a machine that clasped together by a lever; was thrown together. I merely know that it was made of two pieces brought together.

12. X Q. Did you use any other machine then?

A. I don't know, really; there might have been.

13. X Q. So far as you know, the mending was done on a machine which had a movable jaw, which was thrown up to a fixed jaw?

A. Yes; and the rail was held there. I cannot undertake to say that this was the machine. I think quite likely it was. I don't know.

(Signature waived by consent of counsel.)

HORATIO ANDERSON.

1. Q. Please state your name, age, residence, and occupation.

A. Horatio Anderson; age, 49; residence, Chicago; have the agency of the Crucible Steel Works, located at Lewistown, Pennsylvania.

2. Q. Have you been engaged in any department of railroading; and if so, in connection with what railroad, and for how long a time?

1304 A. In connection with the Northwestern Railroad, from the time of its commencement, in 1851, until 1870; although, when I first commenced, it was not the Northwestern. I mean what is now called the Wisconsin division of the Northwestern Railroad.

3. Q. What position did you hold in the management of that road?

A. In the commencement?

4. Q. Yes, sir.

A. I was foreman of the blacksmith-shop until 1859.

5. Q. From that time on?

A. I had charge of the machinery department from that until 1870.

6. Q. Did the mending of rails for that road come under your observation?

A. Partly, as I was master mechanic; of course I had foremen in the shop under me.

7. Q. Did you have general charge and management of the shops at which the rail-mending was done?

A. Yes, sir.

8. Q. Upon what sort of an anvil were rails mended on that road?

A. What we called a plain swage-block, upon the Wisconsin division; they were using what was called the Cawood block partly on the Galena division.

9. Q. I will ask you if there was any difficulty experienced on the Wisconsin division, in mending railroad bars upon the common swage-block?

A. No, not any difficulty that I am aware of.

10. Q. To whom were the reports of rail-mending in this shop made, whilst you had charge of it?

A. They were made to me.

11. Q. Were accounts of the expense of mending rails, by that process, kept in the shops?

1305 A. Yes, kept by the shops; taken by the time-keeper every day; the number of rails; pounds of coal, and pounds of iron, if my recollection serves me, was returned at the end of the month; I cannot be positive.

12. Q. Were these accounts preserved; were they kept?

A. They were on the company's books; I don't know whether they have them yet or not.

13. Q. Where were they put; where were they returned to?

A. The books?

14. Q. Yes.

A. The general office.

15. Q. That office was destroyed by fire in 1871?

A. That office was; I don't know whether the books were or not.

16. Q. Did you, at any time, procure any statements of the expense of mending rails on the common anvil or swage-block, prepared from these books?

A. Yes, sir.

17. Q. State the occasion of it.

A. I gave directions to have them prepared; they were, I suppose, correct.

18. Q. What was the special occasion?

A. We made them for Mr. Whipple; he wanted to ascertain the cost.

19. Q. What time was it?

A. I think it was in 1861.

20. Q. Was it about the time of the trial of the swage-block case at Detroit?

A. It was, I think.

21. Q. To whom did you give these directions?

A. To the shop clerk.

22. Q. What was his name?

A. Lee—William Lee.

23. Q. Where is he now?

A. He is dead.

1306 24. Q. Where have those statements been since the time of their preparation?

A. In my possession; a part of the time at the shops, until I left the road; since then at my house.

25. Q. Until you gave them to me yesterday morning?

A. Yes, sir.

26. Q. Look at that statement and say if that is one of those to which you refer; and state what that purports to be.

A. Well, that is the statement for June 22d, 1861; repairing rails for that month; number of rails repaired, three hundred and twenty-nine; total length, five thousand and seventy-four inches.

27. Q. Look at this paper, and state if that is one of those statements referred to.

A. Yes, sir; June 14th, 1862; number of rails repaired, one hundred and seventeen.

28. Q. State what that purports to be.

A. It is one of these statements: Enclosed please find statement of cost of repairing rails in our shop for month ending June 17th, 1862.

29. Q. Examine this paper and state if that is one of the statements.

A. That is one of them.

30. Q. State what that purports to be.

A. It reads: March 20th, 1862. Statement of repairing rails in our shop for seventeen days and seven hours, ending February 24th, 1862.

31. Q. Look at that paper and state whether that is another of these statements.

A. That is another one.

32. Q. State the date of it.

A. This is July 8th, 1862. Below please find statement of costs of repairing rails for three months, at our shops, from April 1st, 1862, to July 1st, 1862.

1307 33. Q. Where was the shop located at which the rails were repaired that are referred to in these statements?

A. The Wisconsin division shops, between Erie street and Chicago avenue, in Chicago.

34. Q. Upon what were these rails mended?

A. On the common swage-block—plain block.

35. Q. Did these statements submitted include all the cost of repairing rails during that time?

A. So far as my knowledge goes I did not prepare them myself, but they were prepared by the clerk and taken from the company's books.

36. Q. After the consolidation of the Northwestern Railway with the Galena & Chicago Union Railroad did you still have general charge of the rail mending?

A. Yes, sir.

37. Q. What other form of block was used on the Galena division of that road?

A. They used what was called a Cawood block, one movable jaw with a stationary one.

38. Q. Did you ever have any other form of block set up to experiment with in the shops of the Wisconsin division of the Northwestern Railway?

A. Yes, sir; we had one. I think it was called the Davis block; got up at Michigan City.

39. Q. Was that given a trial?

A. Yes, sir. The owner of the patent sent a man there to show us what to do with it, and I think he worked there some two or three days mending rails.

40. Q. What was the result?

A. The first rail he mended he put on about nine feet, and he was nearly two days doing that; and when he got the rail completed it was not fit to put in the track.

41. Q. Did you frequently have occasion to notice the mending of rails on the Galena division of the Northwestern Road?

1308 A. I saw them frequently. I used to visit the shops once or twice a month.

42. Q. Did you ever notice the mending in comparison with the mending on the Wisconsin division? The accounts of the two shops went through your hands?

A. Yes, sir.

43. Q. Do you recollect now whether there was any great difference in the cost of repairing rails on the two divisions?

A. I do not. It runs in my mind that there was not much difference in the cost, but I would not be positive about it.

44. Q. Were you a practical blacksmith?

A. Yes, sir; served my time at it, and worked at it about twenty years.

45. Q. What, from your observation, has been your judgment as to the comparative merits of the two forms of mending rails, upon the Cawood machine or the plain block?

(Objected to, as the witness has already stated there was a patent block, but there is no proper foundation for the question.)

A. My own judgment is that we could do a sounder job on a plain block.

46. Q. Please give your reasons for your judgment.

A. In patching the rails on the jaw-block you have to trim off the top, which makes the edges thin so that they cool quickly; but on the plain block you put the piece on the top, weld it on, then turn the rail down on its side and weld up the thin edge. That was my reason for thinking we could do a sounder job. It was a pretty difficult matter to do a bad job on the plain block, for if it was not welded solid on the top it will pull off before you get the other welded on.

47. Q. What is the most important part in respect to skill and experience required in mending rail?

A. Well, a good solid weld is the main point.

48. Q. What is necessary in the first instance in order to get a good weld?

1309 A. A good heat. When I said a good weld, of course I meant a good heat.

49 Q. What proportion of the time consumed in mending the rail is occupied in procuring the heats?

A. I don't know as I could answer that, it is so long since I have mended any rails.

50 Q. Would it, or not, be any considerable portion of the time?

A. Well, I cannot tell what proportion of the time it would be now; it depends something on your fire; sometimes your fire works better than at other times, and heats faster.

51 Q. Can you now state, from your recollection, what number of rails were mended per day, at one fire in the shops, of the Wisconsin division of the Northwestern Railway?

A. That depended somewhat upon the amount put on; I think about twelve or thirteen; they would average about twelve or thirteen rails per day, with, perhaps, twenty inches of mend, though there might be more or less.

52 Q. You don't remember whether there were more or less mended on the Galena division than on the Wisconsin division of the Northwestern Railway?

A. I cannot say.

By Mr. NILES: I offer in evidence these statements as exhibits, marked respectively: "Nos. 1, 2, 3, and 4."

53 Q. From your observation of the working of the patent block, which was introduced and experimented with, in the shops of the Wisconsin division, what judgment did you form of the value of such contrivance?

A. I considered that worthless—that block.

54 Q. Did they have clamping jaws, that held the rail?

A. It had one movable jaw; it tipped back instead of sliding.

55 Q. And the other was a fixed jaw?

A. The other was a fixed jaw.

1310 Cross-examination by Mr. Curtis:

1. X Q. You have testified before in court, on one or two occasions, in regard to this matter?

A. I think I have; two, certain; I am not sure but three.

2 X Q. Did you, at either of those trials, produce these accounts which you now have produced?

A. No, sir.

3 X Q. Where were they?

A. They were not made, I think, at that time.

4 X Q. Were they not made in 1867 when you testified; in October, 1867?

A. They were in my possession in the shops at that time; in my desk.

5. X Q. Were they not made for use at that time?

A. They were made for Mr. Whipple.

6. X Q. You testified without producing any account as to mending on the common anvil, did you not?

A. I don't recollect as to that just now.

7 X Q. Do you not remember what you did testify about?

A. I cannot recollect what I did testify to; that is, I did not suppose I would ever be called upon to recollect it, and it has slipped my mind.

8. X Q. What was the name of the man who worked at your shop here in Chicago, who testified at the trial in Detroit, and, I think, was a Frenchman?

A. Joseph Chertona.

9. X Q. Where is he now?

A. He is here in Chicago.

10. X Q. Where does he work?

A. I think he has a shop on Clinton street, south of Madison; I cannot tell you how far.

1311 11. X Q. He is the man who actually mended the rails in Chicago?

A. He was the foreman in that shop, I think.

12. X Q. Did you ever mend a rail in your life with your own hands?

A. I don't think I ever did.

13. X Q. Did you ever measure a rail yourself to see how many inches had been put upon it; if so, when?

A. I don't know as I ever did.

14. X Q. Did you ever make any measurement of the amount that was mended in that shop, or mended by your foreman?

A. I don't know as I ever did; I trusted that to my foreman.

15. X Q. Of your actual knowledge you knew nothing of the truth of his reports?

A. I know nothing, only they were made by my instructions and of my own knowledge; of course I don't know; I didn't make them myself.

16. X Q. You spoke of visiting the shops of the Galena and Chicago division; during what year was it?

A. I had charge of it from 1864 up to 1870.

17. X Q. When did you last have an interview with Mr. Whipple?

A. I saw him yesterday; had no particular interview with him.

18. X Q. Did you see him also day before yesterday?

A. Day before yesterday was Sunday.

19. X Q. Well, on Saturday?

A. I saw him Saturday night.

20. X Q. Where are you now working, and in what capacity?

1312 A. I have an office at No. 51 Fifth avenue; I have the agency of the Crucible Steel Works, located at Lewistown, Pennsylvania.

21. X Q. Did you ever, yourself personally, keep an account of the number of rails repaired any day?

A. I don't know as I ever did, unless I came along, saw what they had been mending, and counted them.

22. X Q. You might have done so, but you do not now recollect that you did?

A. I don't know as I did.

HORATIO ANDERSON.

EXHIBIT 1.—*Dep. of H. Anderson.—H. W. B.*

JUNE 22D, 1861.

Mr. WHIPPLE:

DEAR SIR: Below please find statement of cost of repairing rails at our shops for 24¼ days, ending 21st inst.:

No. of rails repaired 329
Total length of weld ..... 5074 inches.

MATERIALS USED.

490 lb. scrap iron @ 2½ c	$12.25
5835 lb. Blossburg coal @ $6 per ton	17.50
Cost of materials	$29.75

LABOR.

1 blacksmith, 24¼ days @ $1.62½	$39.41
1 helper, " " $1.12½	27.28
1 " " " $1.00	24.25
Cost of labor	$90.94
Total cost	$120.69

Average cost per rail repaired ..... 36 68-100 cts.
Cost per foot of weld 28 54-100
Add 25 per cent. for use of tools, etc 07 14-100
35 68-100 cts.

Yours, respectfully,

H. ANDERSON, M. M.,
Per LEE.

1313 EXHIBIT 2.—*Dep. of H. Anderson.—H. W. B.*

JANUARY 28TH, 1862.

Mr. WHIPPLE:

DEAR SIR: Below please find statement of cost of repairing rails at our shop for eight days, ending January 17th, 1862:

No. of rails repaired	117
Total length of weld	1994 inches.

MATERIALS USED.

243 lb. scrap-iron, @ 2½ cts	$6 07
3,374 lb. Blossburg coal, @ $6.00 per ton	10 12
Cost of material	$16 19.

LABOR.

One blacksmith eight days, @ $1.75	$14 00
Two helpers " " " 1.00 each	16 00
Cost of labor	$30 00
Total cost	$46 19

Average cost per rail repaired	39 48-100
Cost per foot of weld	27 75-100
Add 25 per cent. for use tools	06 95-100
	34 74-100 cts.

Yours, respectfully,

H. ANDERSON, M. M.,
Per LEE.

EXHIBIT 3.—*Dep. of H. Anderson.—H. W. B.*

MARCH 20TH, 1862.

Mr. WHIPPLE:

DEAR SIR: Below please find statement of cost of repairing rails at our shops for seventeen days and seven hours, ending February 24th, 1862:

No. of rails repaired	280
Total length of weld	5,768 inches.

MATERIALS USED.

685 lb scrap-iron, @ 2½ cts	$17 12
6,800 lb Blossburg coal, @ $6.00 per ton	20 40
Cost of materials	$37 52

1314 LABOR.

One blacksmith 17 7-10 days, @ $1.75	$30 97
Two helpers " " " $1.00 each	35.40
Cost of labor	$66 37
Total cost	$103 89

Average cost per rail repaired ..... 37 10-100 cts.
Cost per foot of weld ..... 21 61-100 cts.
Add 25 per cent. for use of tools ..... 05 40-100 cts.
27 01-100 cts.

EXHIBIT 4.—*Dep. of H. Anderson.—H. W. B.*

JULY 8TH, 1862.

Mr. WHIPPLE:

DEAR SIR: Below please find statement of cost of repairing rails at our shops for three months from April 1st, 1862, to July 1st, 1862:

APRIL.

No. of rails repaired 300
Total length of weld ..... 6,615 inches.

MATERIALS USED.

775 lb iron, @ 2½ cts	$19 37
8,312 lb Blossburg coal, @ $6.00 per ton	24 93
Cost of materials	$44 30

LABOR.

One blacksmith 23¾ days, @ $1.75	$41 56
Two helpers " " $1.00 each	47 50
Cost of labor	$89 06
Total cost	$133 36

Average cost per rail repaired ..... 44 45-100 cts.
Cost per foot of weld ..... 24 19-100 cts.
Add 25 per cent. for use of tools ..... 06 04-100 cts.
30 23-100 cts.

MAY.

No. of rails repaired 346
Total length of weld ..... 7,282 inches.

MATERIALS USED.

500 lb iron, @ 2½ cts	$12 50
8,925 lb Blossburg coal, @ $6.00 per ton	26 78
Cost of materials	$39 28

1315 LABOR.

One blacksmith 25½ days, @ $1.75	$44 62
One helper " " $1.12½	28 69
One " " " $1.00	25 50
Cost of labor	$98 81
Total cost	$138 09

Average cost per rail repaired ..... 39 91-100 cts.
Cost per foot of weld ..... 22 75-100 cts.
Add 25 per cent. for use of tools ..... 05 68-100 cts.
28 43-100 cts.

JUNE.

No. of rails repaired 332
Total length of weld ..... 6,500 inches.

MATERIALS USED.

250 lb iron, @ 2½ cts	$6 25
8,050 lb Blossburg coal, @ $6.00 per ton	24 15
Cost of materials	$30 40

LABOR.

One blacksmith 23 days, @ $1.87½	$43 12
One helper " " $1.12½	25 88
One " " " $1.00	23 00
Cost of labor	$92 00
Total cost	$122 40

Average cost per rail repaired ..... 36 86-100 cts.
Cost per foot of weld 22 59-100
Add 25 per cent. for use of tools 05 64-100
28 23-100 cts.

Yours, respectfully,

H. ANDERSON, *M. M.*
Per LEE.

WILLIAM P. LEE.

1. Q. Please state your name, age, residence, and occupation?
A. William P. Lee; age, 43; residence, Mexico, Mo.; occupation, road-master.
1316 2. Q. How long were you road-master on the Chicago & Alton Railroad.
A. Seven years.
3. Q. When; in what years?
A. I went there in May, '67; it is not quite seven years.
4. Q. What were your duties as road-master?

A. As road-master I superintended the track, and had charge of the shops on that division of the road.

5. Q. What machine did you use to mend rails with?

A. It was a jaw-machine; I do not know the name.

6. Q. How often were you in the repairing-shops?

A. I would be there most every day; I lived there.

7. Q. By whom were the reports of the mended rails made to you?

A. By Alexander Snodgrass.

8. Q. Who was it that made the reports to you?

A. The foreman of the shop.

9. Q. To whom did you return these reports?

A. To K. F. Booth, chief engineer at Chicago.

10. Q. What had you to do with the repairing of the rails?

A. I had all the charge of the shop as far as that was done.

14. Q. Who furnished the materials?

A. The company; the Chicago & Alton Railroad Company.

12. Q. Who attended to getting them.

A. I attended to ordering them.

13. Q. If rails or fuel were wanted, who did the men apply to?

A. To K. F. Booth.

14. Q. Directly or through you?

A. Through me, sir.

1317 15. Q. Whilst you were road-master of the road, how many patches did you usually put on to a rail, on the average?

A. On both ends, or one?

16. Q. Taking all the rails together, during the whole time when you were there, how many patches would they average to a rail?

A. I think about two-thirds of the mended rails were patched, probably.

17. Q. How many inches, would you say, was the average patch?

A. About six inches.

18. Q. About how many inches would all the rails average?

A. About six inches.

19. Q. How many heats would you have to the rail?

A. One.

20. Q. What instructions were given to you, or by you, as to the length of the patch?

A. My instructions was, not to put on more than eight inches on the rail.

21. Q. In repairing rails, what proportions were mended at one end only?

A. About three out of ten.

22. Q. What proportion of rails are simply cut off, or straightened, without being patched?

A. About one-third.

23. Q. In the reports returned by you, and received by you, were the rails classed as repaired rails, all of them?

A. They were all classed as repaired in the reports.

24. Q. Whether they were cut-off rails, or straightened rails, or whatever way they were treated, they were reported as repaired rails?

A. Yes, at that time.

25. Q. Did you ever hear of the term Dutchman, in regard to mending rails?

1318 A. Yes, sir; we used the Dutchman.

26. Q. What dose that mean?

A. It means splitting open the end of the rail, and putting in a piece of iron, and fastening it down.

27. Q. How long was this mending, generally?

A. About an inch; just split the rail, and shove in a Dutchman there, and weld it.

28. Q. How many rails were mended in that way; that is, about how many, or what proportion of them?

A. I should think probably about one-fifth?

29. Q. Were these reports made to you, and by you in writing?

A. They were made by me, and copied, and sent to Chicago.

Cross-examination by Mr. Curtis:

1. X Q. You worked at Springfield a while; was road-master there?

A. Yes, sir.

2. X Q. How long did you work, from first to last?

A. Went there in 1867, left in October, 1872—from 1867 to October, 1872.

3. X Q. What time in 1867 did you go there?

A. On the first of May.

4. X Q. Who worked in the shop at Springfield, as foreman, doing the work and mending the rails?

A. Alexander Snodgrass was the workman; he had charge of the shop.

5. X Q. Did a man named Costigan work there?

A. Yes, sir.

6. X Q. Was there a man by the name of Brennan working there?

A. No, sir; Brennan never was there.

1319 7. X Q. Brennan never was there?

A. No, sir.

8. X Q. Where is Alexander Snodgrass now?

A. Dead and gone.

9. X Q. If you have any actual record, give, precisely, the number of inches mended, at the time, on that road, while you were in charge of the shops, as road-master, at Springfield. Will you state when and how, by whom and where, that record was made, and where it now is?

A. We kept no inches on it.

10. X Q They never kept a record of any inches?

A. No, sir.

11. X Q. From what did you determine the average?

A. From the number of rails mended.

12. X Q. Did you keep a record, in that shop, of how many rails were taken to the shop that were cut off without being patched, and how many were patched?

A. Only as the report shows how many were mended.

13. X Q. Does the report designate between those cut off, straightened, mended in the flange, and patched?

A. No, sir; it does not.

14. X Q. What men worked with Costigan?

A. Alexander Snodgrass; they were all I had in the shop.

15. X Q. You had but two men in the shop?

A. That was all.

20. X Q. How much coal did you use at each fire per day?

A. I could not tell you.

21. X Q. How much iron did you use each day?

A. The reports, footed monthly, showed the amount of iron; probably about two pounds a foot, I should think.

22. X Q. What was the dimensions of the iron you used?
A. Two and one-half inches by five-eighths inches.
1320 23. X Q. How can you say, then, that the iron weighed two pounds a foot?
A. When you know the amount of iron used for a month, you can tell pretty near that way.
24. X Q. How many rails did you turn out, at that shop, per day, on an average?
A. About fifteen.
25. X Q. Did the men work exclusively at mending rails, or did they do some other work?
A. Sometimes they had some other work—mending tools, and such things as that.
26. X Q. Did you point or make any frogs while you were at work there?
A. Yes, sir.
27. X Q. It was the business of Mr. Snodgrass to be present at the shop and take part in the work?
A. Yes, sir.
28. X Q. It was your business to be along the line of your portion of the road, was it not?
A. Yes, sir.
29. X Q. Who made the frogs?
A. Snodgrass made all the frogs.
30. X Q. When you say that three-tenths were mended, only, or that one-third were cut off and straightened, on an average, and that the amount was charged at six inches, whether a patch was put on with a dutchman, or was put on the face, you are speaking not from actual measurement, or from the record, but from your best recollection now, are you not?
A. Yes, sir.
31. X Q. Did Costigan make any frogs while working at Springfield?
A. He might have helped a little, but Snodgrass generally made them.
32. X Q. Who preceded you as road-master, on division number four?
1321 A. David Forbush, when I left.
33. X Q. Who preceded—was there before you?
A. His name was Gouse. I do not know his initials. He was only there four or five months. Wade was there before I came, but I do not know how long Wade was there.
34. X Q. Did you have an account which showed the number of pounds of iron used each year?
A. We had our monthly reports.
35. X Q. Where are those reports?
A. They are here, in Chicago.
36. X Q. Returned to Mr. Booth?
A. No, sir; my original reports.
37. X Q. Did you have any account which showed the number cut off or mended?
A. No, sir.
38. X Q. Did you have any account which showed the number of feet of iron used?
A. Only the reports made monthly.
39. X Q. Did these reports contain such account of the amount of fuel used each month?
A. Yes, sir.

40. X Q. Was it an account of coal used for mending rails, or used for all purposes, in a blacksmith-shop?

A. For all purposes. We used coke for mending rails; we used coke altogether.

41. X Q. What did you pay per bushel for coke?

A. I could not tell. Mr. Hart was purchasing-agent.

42. X Q. What wages did you pay?

A. We paid boss blacksmith ninety dollars per month, the others three and a half dollars a day, the helpers two dollars and one dollar and seventy-five cents a day.

43. X Q. How many men did you have at each fire?

A. Three.

44. X Q. How many men in the shop?

1322 A. Six, altogether.

45. X Q. Two fires you had?

A. Two fires.

46. X Q. You have told us that you had only two men at one fire.

A. No, sir; I did not.

47. X Q. You are sure you did not?

A. Yes, sir.

48. X Q. Who and how many helpers did you have?

A. Snodgrass, with one man, Costigan. I could not tell who the helpers were, all of them.

49. X Q. You had more than two men in your shop?

A. I should think I did.

50. X Q. I suppose you did.

A. I understood you to ask how many fires there were, and I said two; you did not say anything about the men in the question you put to me.

51. X Q. If I recollect rightly, in your answer you answered specifically, giving the names; I now ask you what men were there in the shop in any capacity.

A. There were six men altogether. I cannot tell you the names of all of them.

51. X Q. Did you know the names at the time?

A. Yes, sir.

52. X Q. Is your memory pretty good?

A. Pretty good, sometimes.

53. X Q. Not good enough to recollect the names of all the men?

A. No, sir. There was Costigan, Snodgrass; I forget the others; we used to change men pretty frequently; I could not say actually what their names was.

54. X Q. Do you remember Thomas Welby?

A. Yes, sir.

55. X Q. What is he doing?

1323 A. Working at one of the fires, repairing tools. I have not been there for a year and a little over.

56. X Q. Do you know how much could be mended at one heat on the jaw-block machine by a good blacksmith?

A. I do not think over eight inches.

57. X Q. What was the length of the jaw-machine you used?

A. I could not tell you what it was; I never measured.

58. X Q. Did you ever personally make any measurement by rule of the length in inches put on the rails mended in one day?

A. No, sir; I never did.

59. X Q. You have given us the best guess you can; you have not given an actual measurement?

A. I have given you my best judgment, sir, from my own knowledge. I guess that is about all any of them knows about it.

Re-direct examination by Mr. Payson:

30. Q. Are you acquainted with the handwriting of Alexander Snodgrass?

A. Yes, sir; I am.

31. Q. Will you look at the account now shown you and state whether that is in his handwriting?

A. Yes, sir; that is his handwriting.

32. Q. What does that account contain?

A. That is the monthly report from the shop.

33. Q. Made to you?

A. Made to me, and a copy of it sent to K. F. Booth, Chicago.

34. Q. How often are these reports made?

A. Every month.

35. Q. Did they show the number of rails repaired?

A. The number of rails cut off and repaired.

1324 36. Q. Does it show the amount of fuel or iron used?

A. Yes, sir, it does; coke or coal.

37. Q. State if the reports now shown you are in the handwriting of said Snodgrass.

A. I suppose they are, unless he happened to be absent, sick, or something kept him away from the office.

38. Q. Were these monthly reports returned to you as road-master?

A. Yes, sir.

39. Q. Were supplies sent and paid for according to those reports?

A. Yes, sir; sent by A. P. Hall.

40. Q. How many reports are there in you' hand?

A. Thirty reports, if there is all of them.

41. Q. Are you able to state, from the inspection of them, how many or about how many pounds of iron these reports show to the rail?

A. Well, I should think, about a pound or a pound and a half to the rail; nearly that.

Re-cross examination by Mr. Curtis:

60. X Q. How do you identify these papers as the reports made to you, where have they been, and where did you get them?

A. Right from my own foreman.

61. X Q. Will you please explain how you identify these papers as being the reports made to you?

A. It was my orders.

62. X Q. Yes, but about these papers, how do you identify them, how do you know they are the reports made to you?

A. I could not tell anything about that.

63. X Q. Are you still at work for the company?

A. Yes, sir.

1325 64. X Q. Are you at the same place?

A. No, sir; I am at Mexico, Missouri.

65. X Q. Have you kept these papers in your possession since you left that place?

A. Yes, sir; they were put in the box at my office and kept in the desk.

66. X Q. Can you take any of those reports and point out any rail

mended, or any specific number of rails contained in that report, and tell which were straightened or cut off, and where repaired by patching at all on the machine?

A. No, sir; I could not.

67. X Q. Did you sometimes cut off one end of a rail and repair the other?

A. No, sir.

68. X Q. Never did that?

A. No, sir.

69. X Q. That was not ever done in that shop?

A. Never, to my recollection.

70. X Q. Where did you put, in the track, those that were repaired on the anvil?

A. Put them in the main track or on the side tracks.

71. X Q. Did you put any patched rails on the sidings?

A. Sometimes we used the rails on the side track; all the old iron.

72. X Q. You are sure you did not patch one end of the rail and cut off the other end?

A. I do not recollect anything of the kind.

73. X Q. The men who did the actual work of the shop would know about that, wouldn't they?

A. Probably they would. We might have cut off some after we got down to four-inch iron, and mended the other end. I could not say exactly about that.

24. X Q. Do you know whether any of these rails that were patched on the machine and put in the main track are in the main track now?

1326 A. I do not think there is a three-and-a-half-inch rail on the road.

75. X Q. You had some work on the fish-joint rails?

A. A very few.

76. X Q. Have you any idea how many frogs you made or pointed while you were in charge of that shop?

A. We made a good many frogs; made most all the steel T-rail frogs made on that division.

77. X Q. About how many frogs per week could you turn out?

A. I could not tell. We had a car-load of steel run, all to be used for that purpose, and we made frogs just according to how the work crowded us.

Direct examination resumed.

By Mr. Payson:

42. Q. I find among these last reports a number signed by John Hall and William Crow; do you know the handwriting of these men?

A. No, sir.

(Signature waived by consent of counsel.)

WILLIAM HUSKINSON.

1. Q. Please state your name, age, residence, and occupation.

A. William Huskinson; age, 48; residence, Alton, Ill.; occupation, road-master.

2. Q. How long have you been road-master on the Chicago & Alton Road?

A. About nineteen years; that is, altogether.

3. Q. What have been your duties as such road-master?

A. To take charge of the track, bridges, repairs of iron, during the portion of the time while we were running the shops in that capacity.

4. Q. How often were you in the repair-shop?

1327 A. Well, I was generally in there most every day; that is, once every day.

5. Q. What had you to do with the mending of rails?

A. I had general charge of the men working at it.

6. Q. What would be your means of knowing what work they did?

A. Personal observation.

7. Q. By whom were the reports of the repairs of rails made?

A. By the blacksmith; he made the reports to me.

8. Q. What did you do with them?

A. Sent them to the chief engineer's office in Chicago, Mr. K. F Booth.

9. Q. What faith was placed in these reports by you and the officers of the road generally? Did they act upon them at all?

(Objected to as incompetent.)

A. They acted upon the reports as being accurate.

10. Q. Were the men paid according to these reports?

A. According to the time. A portion of that is from them.

11. Q. Was not the iron used for mending rails and fuel furnished upon them?

A. I sent a request to Chicago for those things.

12. Q. While you were road-master how many patches were you in the habit of having put upon the rails, on an average?

A. It was very seldom there was more than one patch put on a rail.

13. Q. How many inches to the patch were you in the habit generally of putting on?

A. Rarely more than six or seven inches.

14. Q. What would be the amount of mending per rail during the whole time?

1328 A. It would not be more than six inches to the bar, throwing out the cutting and straightening rails?

15. Q. How many heats were you in the habit of having to the rail?

A. In my instructions?

16. Q. In the instructions you received or gave?

A. Instructions I gave?

17. Q. What instructions in regard to rail-mending did you give?

A. That they should not usually take a second heat.

18. Q. Were those directions given by you to the men?

A. Given by me to the men.

19. Q. About how many inches would you have mended to the heat?

A. There was occasional instances where we had over six inches and up to eight. There was more that would not exceed more than three or four inches to the rail.

20. Q. How many Dutchmen were you in the habit of putting into your rails at that time; a large or small proportion?

A. It would vary, of course, according to the necessity; it would probably average about one-third.

21. Q. How long were they?

A. In length perhaps from two to three inches.

22. Q. What proportion of rails were simply cut off and straightened without being patched?

A. Well, to the best of my judgment, it would average, probaly, one-fourth of the gross number repaired.

23. Q. Did the reports which you made at that time show the number of rails cut off?

A. No, sir.

24. Q. Was there any item from which you could get at the number of rails cut off?

A. There is a column of iron; you could get at it pretty near.

1329 25. Q. From the reports made to you?

A. Yes, sir.

26. Q. In the reports returned to you, and which you returned to the chief engineer, were all these rails cut off and returned to you as mended included in your reports under the term "repaired rails?"

A. Yes, sir.

27. Q. You had more or less to do in regard to the monthly reports you made?

A. Yes, sir.

28. Q. How often were they sent out?

A. Every month.

29. Q. By whom; the foreman of the blacksmith shop?

A. Yes, sir.

30. Q. Look at the report shown to you and see whether it is such a report as you sent in.

A. They are the reports.

31. Q. What do those reports show?

A. The reports show the number of bars repaired, cut, and straightened.

32. Q. What do they show as to the coal?

A. They show the amount.

33. Q. Do they show the amount of iron?

A. Yes, sir; in the last column on the right.

34. Q. The upright column has those accounts in?

A. Yes, sir.

35. Q. The iron used for repairing rails is shown in the border column?

A. Yes, sir.

36. Q. And is there a column showing the number of rails and the number of feet mended?

A. Yes, sir; the lineal feet, as shown here.

37. Q. The number of feet mended and the length of the rail?

A. Yes, sir.

1330 38. Q. The total number of bars?

A. It means the whole length of the rail.

39. Q. Was the number of feet and inches of mend on the rails in all the reports?

A. Yes, sir.

40. Q. What reason have you for believing these reports?

A. For the reason I have seen the rails handled, and my own judgment.

41. Q. Were these reports you have been speaking of accepted by the officers of the company and regarded as accurate?

A. Yes, sir.

42. Q. These reports were made regularly to you in a tabular form every month?

A. Just as you see them here.

(The defendant offers said reports, ten in number, in evidence, and they are hereto attached and marked "Exhibits from one to ten inclusive, deposition of Wm. Huskinson.")

There should be twelve; if there are any lacking, it should be on the following years.

Cross-examination by Mr. Curtis:

1. X Q. Where are the reports of mending done for the years eighteen hundred sixty-seven, eighteen hundred sixty-eight, and eighteen hundred sixty-nine?

A. There they are; they was all here.

2. X Q. Were the men paid before these reports came in, or afterwards?

A. They were paid afterwards; these reports were made after the last day of each month.

3. X Q. Were they paid by the day?

A. Paid by the day.

4. X Q. Do you find any column which shows the number of days each man worked?

1331 A. No; properly the amount of money charged against the iron for repairs.

5. X Q. How did the pay of the men depend upon the reports, if the reports did not contain the number of days' work done by the men?

A. The men are not paid from these reports at all; they are paid from the regular pay-rolls.

6. X Q. Then they are paid by the paymaster, upon the pay-roll, and not upon these reports?

A. Not upon these reports.

7. X Q. In stating that the average amount of mend, per rail, would not exceed six inches, and that six or eight inches was the highest measurement of one heat, and that one-third of the rails reported as repaired had Dutchmen put in them, in which not over two and a half to three inches in length of patch was put upon the rails, you have given us the best guess you could; but you have no actual record from which you are enabled to state positively in regard to these matters?

A. No; nothing except personal observation. We kept no true record of the inches welded upon them; or, at least, I did not.

9. X Q. What column do you find, in these reports, which shows what proportion of rails were cut off and straightened?

A. The second column—the second column outside of the date shows the rails; (indicating upon reports.)

9. X Q. Are you ready to swear that there was fifteen mended in one day?

A. I would not swear they patched that number; the bulk of them were, generally, cut-off rails.

10. X Q. Can you point out, in this report, in any part of it, the aggregate number of rails which were cut off, or straightened, or mended on the flange, and not patched at all?

A. No; I could not point them out separately.

11. X Q. How many fires did you have?

1332 A. I run two fires part of the time; occasionally. There was a good deal to do on the road, work, mending tools, etc.

12. X Q. When did you have charge, as roadmaster, of the shops at Alton? How long did you have charge as roadmaster, while railroad repairing was carried on, on those machines?

A. I had charge from the commencement of shops there.

13. X Q. When was that?

A. In September, 1865.

14. X Q. Who worked there in September, 1865, as blacksmith?

A. I don't remember all the names of the foremen that was there; there was one named Isaac, partner of Reid.

15. X Q. Is Reid working for you now? Did he make out the reports there?

A. I don't know; maybe a few; he was there about eleven months.

16. X Q. Before using the machine did you use the common anvil to repair rails with?

A. No; we used the same block from the commencement.

17. X Q. Did you make frogs at your shop?

A. Yes, sir.

18. X Q. All the time, more or less?

A. Well, more or less, as we needed them.

19. X Q. Where is he now?

A. He is somewhere in New Hampshire, foreman of a blacksmith-shop, I think; at Concord, I think.

20. X Q. Sometimes you mended rails at both ends, did you?

A. Occasionally a rail.

21. X Q. Where are the rails laid which you mended? Are they in the side track or on the main track?

A. There are very few repaired rails in the track at the present time; but those that are in the track are in the side track.

1333 22. X Q. Some of your repaired rails are cut off, are they not?

A. Occasionally, but very rarely.

23. X Q. The foreman actually in charge of the shop would be likely to have an accurate account of the number of rails cut off at one end?

A. He might, perhaps, be likely to know, but the reports were made out under my general directions.

24. X Q. He was there all the time and you were there only a part of the time?

A. I was there generally in the morning—each morning.

25. X Q. Did you mend rails in the middle?

A. Very seldom.

26. X Q. Do you remember when it was that the company commenced cutting off rails?

A. I cut them off when I first commenced.

27. X Q. That was in 1865?

A. Yes, sir; because I had no confidence in a bad tread.

28. X Q. What was the length of the jaws on that machine?

A. I never measured them.

29. X Q. As near as you can remember.

A. Lengthwise?

30. Q. Lengthwise of the jaws.

A. Measured, it might have been from twenty to twenty-two inches.

31. X Q. Do you think you can mend over six inches at one weld?

A. Probably from six to eight.

32. X Q. Do you know the dimensions of the furnace in which you heated your rails?

A. I don't know accurately.

33. X Q. Didn't you write a letter to Mr. Booth in which you included a statement of rails mended in the Alton shop, in 1865?

1334 A. Yes, sir, I did; including in the statement from 1865 to 1870.

34. X Q. What did you enclose in that letter?

A. I could not give you the items in it.

35. X Q. Didn't you keep copies of these reports?

A. Yes, sir.

36. X Q. Were these reports sent by you to Mr. Booth and returned to you in the regular way of business, and did you enclose him the copies?

A. The papers we had were destroyed at the time of the fire.

37. X Q. What different patterns of rails did you have to repair?

A. The common T-rail were the larger proportion; the balance were fish-plate rails.

38. X Q. Whereabouts on your division, No. 5, do you think most of the patched rails are now to be found?

A. At the present time I don't think you can find a single bar upon the main line; you might probably find some upon the side tracks.

39. X Q. Where would you find the most?

A. I think between Macoupin and St. Louis.

40. X Q. Do you know where we would find the most?

A. On the same track where you would find the most done.

41. X Q. As near as you can, tell us the place.

A. Probably the best place would be about Venice.

42. X Q. When would the rails found in such track have been mended?

A. Probably in 1869, and possibly in 1870.

43. X Q. What induced you to give orders to shorten the patches?

A. I never had a great deal of confidence in the patches myself, especially in the long ones.

1335 44. X Q. Whether they were mended or not was not controlled by you, but by other officers of the road?

A. No one interfered with me in that.

45. X Q. A great deal depended on the supply of iron, as regarded mending, did it not?

A. I suppose it did depend on the supply of iron.

46. X Q. Was it not the duty of the officers to direct in regard to that?

A. It was their duty, but I never went to them for my instructions.

47. X Q. You have discontinued the mending of rails?

A. Yes, sir.

48. X Q. Who determined that you should discontinue the mending of rails?

A. I got instructions from Mr. Booth.

Redirect examination by Mr. Payson:

43. Q. Did you make frogs on the jaws?

A. Only occasionally; the jaw-block was standing opposite the furnace, and they occasionally used that there for convenience; the men would use the jaw-block.

44. Q. You made steel frogs mostly?

A. I didn't reckon any repairs on them.

45. Q. Did you make frogs?

A. Yes, sir.

46. Q. On the jaws?

A. No, not in the jaws.

Recross-examination by Mr. Curtis:

49. X Q. Didn't you use the jaws in cutting rails or in making frogs?

A. Before we got the steel rails we used them.

50. X Q. When you steel-pointed your frogs in putting steel on to the frog, you put them into the jaws, didn't you?

1336 A. Very rarely.

51. X Q. Some of the witnesses have testified that they do use

the clamps, and that they could not point the frogs without the jaws; you don't think that is true, do you?

A. I had a man who attempted to mend a frog on the jaws, and he was not competent to do it.

52. X Q. Did Sheard make any frogs for you?

A. He made one frog, and spoiled a considerable quantity of iron in trying to do it.

53. X Q. Was he as competent to do that as anything else?

A. He was a man I paid four dollars a day to.

Redirect examination resumed by Mr. Payson:

47. Q. What wages did you pay down there?

A. I paid him four dollars a day.

48. Q. What did you pay others?

A. Three dollars and fifty cents a day.

49. Q. What did you pay the helpers?

A. Two dollars most of the time, and two dollars and twenty-five cents part of the time.

(Signature waived by consent of counsel.)

JAMES FLAVAN.

1. Q. Please state your name, age, residence, and occupation.

A. James Flavan; age, 40; occupation, blacksmith.

2. Q. You have testified before in this case, have you not?

A. Yes, sir.

3. Q. What division of the road are you on?

A. I worked on division three. I am on it yet, but not working for the same parties. I am working in the company's shops.

1337 4. Q. As blacksmith?

A. No, sir; as helper in the locomotive-works.

5. Q. At the present time?

A. Yes, sir.

6. Q. What kind of rails did you mend?

A. I welded the "T" railroad-iron.

7. Q. How many years were you employed in that work?

A. Four or five years; I was there from 1865 until about three years ago.

8. Q. While so employed, what would be about the average length of the patches—of each patch put on by you?

A. Well, some of them are shorter and some longer; they are most all lengths; that is, you mean the average of one patch with another?

9. Q. The average of the patches of all the different rails?

A. Taking them all around, I suppose they would average—I allow from nine to twelve inches.

10. Q. But, taking each patch by itself, what would the patches measure, taking the long and short—all sorts?

A. You would have to put on whatever patch you would think would do, or whatever patches would answer for the place. I would compute it from about nine to twelve inches to each rail.

11. Q. I am not asking you about the amount of patch on each rail. I am not asking you about single patches; but what the patches average?

A. Some of them would average from two to ten inches.

12. Q. The shortest would be about two inches?

A. Yes, sir.

13. Q. What are the longest?
A. About a foot long.
14. Q. Did you often put on a patch a foot in length?
A. Sometimes we did.
15. Q. Did you put a foot in length as often as you did two inches in length?
A. I did not.
1338 16. Q. Supposing the patches to be all one length, what would be the average?
(Objected to. The witness has just stated that they are not all of one length.)
A. I think the average length you would put on each rail would amount to from nine inches to a foot.
17. Q. Did you sometimes put a single patch on the rails?
A. Always, whenever I could.
18. Q. Were there a large number of rails on that division that were patched at one end only?
A. Yes, sir.
19. Q. If you didn't patch but one end only, and put patches only two inches long on many of them, what would be the average of the rails?
A. Probably five, or six, or seven inches.
20. Q. What proportion of the rails would be patched at but one end?
A. I think there are one-half of them, pretty near.
21. Q. If the patches run from two inches up to five or six, or up to eight or nine, what would be the average length?
A. The average would be about five to six inches. I think they would average that altogether.
22. Q. Supposing the average patch to be five or six inches, and one-half of the rails were mended at one end, what would be the amount of patch per rail?
A. The average patch to the rail would be from nine to twelve inches.
23. Q. Didn't you say to me yesterday that the average patch to the rail would be about six inches?
(Objected to as leading.)
A. I might have said so yesterday, but, come to know the reality, I think it would be from nine to twelve inches. I think that would be the thing. I don't know whether I am right or not.
1339 24. Q. In making your returns of rails repaired, what was included in the returns—what kind of rails?
(Objected to. It does not appear that the witness has ever made any returns.)
A. I generally made the returns. I kept an accurate account of what I done, and I handed them over to other hands. I had to take account of what I done every day.
25. Q. You made the returns yourself?
A. Yes, sir.
26. Q. These returns were of all kinds of rails?
(Objected to as leading.)
A. All kinds.
27. Q. What kinds?
A. From the smallest to the longest, and the heaviest to the lightest; from the common up to the strap iron.
28. Q. What was done with those rails?
A. I don't know what was done with them.
29. Q. What kind of repairing did you do?

A. Patched, cut off, straightened them; did anything needed to be done.

30. Q. Were they all called repaired rails?

A. Every rail was returned as repaired that came into the shop to be fixed.

31. Q. What proportion of all the rails were cut off or straightened, without being patched at all?

A. There must have been about one-fourth. I could not say but there may have been a little more. I am sure there was one-fourth; that I am sure of.

32. Q. Leaving off the rails that were straightened and the rails that were cut off, what would be a fair and reasonable day's work of solid patching at one fire, making no allowance for anything but what you actually did?

A. Do you mean the iron you put on?

33. Q. The length of the iron you put on.

1340 A. Well, I don't know; I think one hundred and twenty inches or so would be a big day's work; we have had to change the men very frequently.

34. Q. You say that one hundred and twenty inches would be a big day's work?

A. Yes, sir; it would be a big day's work for the kind of iron we had.

35. Q. Where do you get the rails to be repaired?

A. Any place along the track.

36. Q. Was there any great difference as to the cutting-off of the rail with the common anvil or the jaws?

A. Yes, sir; there was some difference; you could cut the rail on the block a little better.

37. Q. You could cut them on both?

A. Yes, sir; I did cut them on both, but the men would have less trouble by having the rail in the jaw.

38. Q. Can you do the same amount of patching every day, day by day, or is there any difference?

A. There is a great deal of difference; no man can mend the same amount every day.

39. Q. What does that depend upon?

A. The labor, and the amount of iron, and the different kind of iron; amount of work done on one rail. You can handle three or four rails, where short patches are put on them, while you are handling one with a long patch.

40. Q. What number of inches could you put upon one rail at one heat?

A. I could put on eight or ten inches.

41. Q. Could you do more with long patches than with short ones?

A. Yes, sir; when the rail was heated you can put on more length of patches.

42. Q. Put on the most iron, but do the least number of rails; that is, do more feet and inches with long patches?

1341 A. Put in nearly double what you would do with short patches.

43. Q. You stated in your former examination that you have mended two hundred and eighty inches: what do you say to that?

A. I don't know; at that time the iron that was put in these rails was not fit to be used.

44. Q. Did you put a greater amount of patches on the rails at that time?

A. Yes, sir; three or four times as much.

45. Q. Would you say, then, that two hundred and fifty inches was a fair day's work?

A. It is too much; I would not want to do it.

46. Q. When witnesses say that they have done two hundred and eighty inches a day, do they, in your judgment, mean that they have mended that amount in solid welding?

A. I don't think they could; men will count five or six inches for cutting off; charge that much for his time; I know I have done it many a time.

47. Q. How much do you charge for cutting off in inches?

A. I don't count in inches; I count them as a rail.

48. Q. Were there any accounts kept at your shop of the quantity of iron used?

A. Yes, sir.

49. Q. Who kept those accounts?

A. The road-master.

50. Q. Did you ever see one of those accounts or reports?

A. Not as I know of, sir; they used to come from our hands.

Cross-examination by Mr. Curtis:

1. X Q. You worked for Mr. Ragland, did you not, at one time?

A. No, sir; I did not.

1342 2. X Q. Sometimes you cut off the rails at one end and mended the other end, did you not?

A. Yes, sir.

3. X Q. Sometimes you mended the rail in the middle?

A. Sometimes, sir.

4. X Q. In the fish-plate rails this often happened, did it not?

A. Sometimes, not very often; sometimes it would pay to put a patch on the center, and we would put it in.

5. X Q. You first cut off the rails in your shop in the jaw-block, and afterwards on the common anvil?

A. I done most of my cutting on the block; I could mend the common iron without the jaws better.

6. X Q. Did you ever keep an account in you shop of the number of inches repaired?

A. Yes, sir.

7. X Q. That was your practice?

A. Yes, sir; kept every day.

8. X Q. Did you put it down on a blank?

A. Yes, sir; just as near as we thought would be right.

9. X Q. Did you return the number of inches?

A. If the foreman was away from the shop I would keep it myself.

10. X Q. What did you do with that while you had charge?

A. Gave it to Mr. White.

11. X Q. The road-master?

A. Yes, sir.

12. X Q. It was a printed blank, was it?

A. A printed blank; yes, sir.

13. X Q. While you were helper what wages did you get?

A. I didn't help any then; my wages was three dollars and twenty-five cents; they cut down the wages and I get less.

1343 14. X Q. When did they cut your wages down?

A. I couldn't say exactly.

15. X Q. What do the helpers get?

A. One dollar and seventy-five cents part of the time, and one dollar and ninety cents part of the time.

16. X Q. You say you could do most with the old iron on the common anvil; could you mend, by patching on the top of the old T-rail, as well on the common anvil as you could on the block?

A. I could not, sir.

17. X Q. How was it about the fish-plate rails; were they more difficult to mend than the T-rail?

A. It is more difficult.

18. X Q. Would the block be useful in mending those rails?

A. Yes, sir; it keeps the rail in its proper shape; you cannot keep the rail in its proper shape without a block.

19. X Q. When you put on two hundred and eighty inches, the company wanted you to mend as much as you could in a day?

A. They generally want a man to do all he can.

20. X Q. What time was that; do you remember the year?

A. Well, indeed I don't.

21. X Q. Was it when you first began to mend rails, or after you had been at work some time?

A. It was some time after I began.

22. X Q. They were common T-rails.

A. They were fish-plate rails.

23. X Q. You could have repaired the same on T-rails?

A. On the common rails we could repair more.

24. X Q. Could you put on two hundred and eighty inches on the common anvil?

1344 A. No, sir; could not repair on the common anvil, and do it; I could not, I know.

25. X Q. Did the road-master complain that the work you did—that the patches didn't wear well—came off?

A. I never heard any complaint about the patches; if patches are welded well they won't come off.

26. X Q. You can weld them in the jaw-block, can you not?

A. Yes, sir; I can weld solid.

27. X Q. Using heavy sledges welds the patch down firmly, does it not?

A. Give it an ordinary heat, and you can work in a gray iron; you can use a heavy or light hammer.

28. X Q. Did you have much trouble in using the machine because it cooled the iron, and you could not make the heat stay until you could put the patch on?

A. No, sir.

29. X Q. You had no trouble?

A. No, sir.

30. X Q. After taking three or four heats the jaw becomes very hot, don't it?

A. Yes, sir, it becomes very hot; not a welding-heat nor blood-red heat, but a black heat.

31. X Q. Suppose a first-rate blacksmith were to try how much he could weld at one heat, how many inches do you think he could put on?

A. I don't believe that they could put on more than I used to put on.

31. X Q. That was how much?

A. We could take a heat as long as the furnace would heat; not more than twelve or fourteen inches when the furnaces would hold; when you have room.

32. X Q. The furnaces were not made so that you could take a longer heat?

1345 A. No, sir, we didn't have blast enough. I put in a brick on

each side, so as to make the blast stronger, or narrow it down; that made the opening about eight inches narrower.

33. X Q. If you had had a stronger blast you could make a longer heat?

A. Yes, sir, if you were able to work; the men occasionally worked ten or twelve inches, sir, I think.

34. X Q. Do you remember of the road-master coming and telling you not to put on more than you could put on at one heat?

A. No, sir; that was left to my judgment entirely; to be sure the road-master would come in sometimes, and, if we were putting on a large patch, would suggest that he did not wish to have us repair too much on a single rail, but it was left to myself, to my best judgment, as to what was to be done.

35. X Q. The rails that were cut were those that were badly broken down?

A. Yes, sir; they cut those that were not worth repairing. We cut some to make them of a certain length for a particular use.

36. X Q. Sometimes you cut one end off, and patched the other end?

A. Yes, sir; if we could make it the right length.

37. X Q. Did you jump any rails at your shop?

A. They were jumped before Maj. Ragland gave up the contract.

38. X Q. Did you use the jaws in straightening the rails?

A. No, sir; the jaws did not amount to anything in straightening the rail. We did not use the machine in straightening the rails.

39. X Q. Was Mr. White road-master all the time you worked at mending rails?

A. Yes, sir.

1346 Redirect examination by Mr. Payson:

52. Q. How many rails did you mend on a common anvil?

A. I never mended any, sir.

53. Q. Were these two hundred and eighty inches, that you speak of mending, so many inches of solid weld, or did it include cutting off and straightening the rails?

A. That was all solid weld.

54. Q. Did you take any measurement of it?

A. When the rail was finished, I measured what I put on the rail; when I put on three pieces of iron, I put it down; when I put three patches on one rail, one after the other, we could put more on, because it took less time to heat the rails.

55. Q. What was the form of these reports that you returned to the road-master?

A. What is the form of them, sir?

56. Q. Yes.

A. I don't know what you mean.

57. Q. What was the form of it; was it a printed paper?

A. Yes, sir; the same as the printed circulars that you have here.

(The witness is now shown one of the printed reports identified in the testimony of N. Cornell.)

58. Q. The same form as these, now shown you?

A. The same form.

59. Q. Does this report show the amount of welding done? [In handing witness one of these reports.]

A. Yes, sir; you see the different lines commence with the length of rails, 15, 18, 21, 24, 27, 28, used along the line.

60. Q. What column shows the amount of welding done?

A. Here it is [indicating]—ten pounds of iron, seven pounds, twenty pounds.

1347 61. Q. Is there no account of the amount of welding done, except in the iron column?

A. No, sir; the amount is added up.

62. Q. Is there no column showing the number of feet and inches of weld?

A. No, sir.

63. Q. Is there any column from which you can get it?

A. There is a column showing the number of rails.

64. Q. Could you determine from this account about how many feet and inches were welded?

A. No, sir, not mended; you could divide the whole number of inches mended by the number of rails.

65. Q. This account shows three hundred and forty rails repaired, and two hundred and ten pounds of iron used, making less than a pound to a rail; how many feet of mending per rail would that indicate?

(Objected to.)

A. I don't know, sir.

66. Q. How many pounds of iron do you use in mending, per foot?

A. Three or four or five; sometimes a foot of iron will weigh four pounds.

67. Q. If you use one-half a pound of iron, how much mending would that do?

A. Not much.

68. Q. If you used two pounds, how much would it mend?

A. I should think six or seven inches.

69. Q. Are these the kind of reports you sent in to the road-master?

A. Yes, sir; all I saw of them is just the same.

70. Q. If you had furnaces big enough you could heat the rail from end to end, couldn't you?

(Objected to.)

A. Yes, sir.

1348 71. Q. Could you mend that whole rail so heated, without putting it into the furnace again?

A. No, sir.

72. Q. Why not?

A. I don't think it possible; the iron would cool before you could weld the whole length.

73. Q. Would the iron keep its heat while you are so repairing it?

A. No, sir.

74. Q. Does the iron, when taken out of the furnace, cool rapidly or slowly?

A. It cools pretty fast when you take it out of the fire.

75. Q. Now, how many inches could you weld before the iron lost its proper welding-heat?

A. Nine or ten or twelve inches—a foot at a heat.

76. Q. Would a foot welded be as well done as a shorter patch?

A. Yes, sir; I can mend a foot as solid as two inches; give me heat enough.

Recross-examination by Mr. Curtis:

40. X Q. Did you put down the quantities you mended, or the amount of iron you used?

A. I put it down the same as it is there; no other directions were given to me.

41. X Q. You kept an account of the amount of iron used?

A. Yes, sir.

42. X Q. You told us, on your direct examination, that you didn't keep the account of the iron, but that the road-master kept that; I so understood you?

A. The way it was, the road-master took the account we gave him.

1349 43. X Q Did you keep the account of the mending-iron you used, in pounds, each day?

A. Yes, sir.

44. X Q. How did you get at it? Did you weigh it out before you put it down?

A. Sometimes we had the amount weighed out; sometimes we measured the iron, allowing for what was needed on each bar, and allowing so much for it.

45. X Q. Now state whether it was estimated or actually weighed?

A. That was the same as actually weighed; the same as if you would weigh it when you would take it to put on.

(Signature waived by consent of counsel.)

JOSEPH POOL.

1. Q. Please state your name, age, residence, and occupation.

A. Joseph Pool; age, 45; residence, La Porte, Ind.; occupation, track-master.

2. Q. In what capacity, and how long, have you been connected with the Michigan Southern and Northern Indiana Railway?

A. About twelve years; I was running a construction train for about ten years, and the remainder of the time have been acting as track-master.

3. Q. During what years were you running the construction train?

A. I commenced running the construction train in 1858, until 1859, and came back to run the train in 1863, and from that to 1871; from that time have been road-master on the Chicago division, from Chicago to La Porte—from 1871.

4. Q. Over what part of the road did you run a construction train?

A. From Chicago to Elkhart, one hundred miles of the west end.

1350 5. Q. What means of knowledge had you, during that time, in regard to the rails mended, on your division of the road?

A. During the time I was running the construction train, I had the handling of all the damaged iron, picked it up, from along the road, and delivered it to the blacksmith-shops, unloading it there, and distributed the mended iron. I made the reports to the civil engineer of the amount handled, each day, of damaged rail, the length of the rails, and the amount of damage upon them; I also kept the account of the number of rails, and the length of the mend, and about how long they were welded, whether they were welded in a flat place, or cut off.

6. Q. When you speak of iron, do you mean the rails?

A. I mean the T-rails.

7. Q. During that time, what means of knowledge of the operation of the repair-shops did you have?

A. I was there twice a day, sometimes more; I was in the shop at least twice a day, sometimes four or five times a day.

8. Q. Do you know what proportion of rails, so handled by you during that time, were cut off, or mended in the flange, or straightened, and not patched on the head?

A. I did, at the time.

9. Q. Have you a recollection, at this time, on the subject?

A. About one-fourth, between one-fourth and one-half, as near as I can tell now—yes, as near as I can tell, at the present time; at the time, I knew.

10. Q. As near as you can tell, what was the proportion?

A. I think that it was about one-half welded on the head of the rail.

11. Q. What proportion of the rails do you, according to your present recollection, think were either cut off, or mended in the flange, or straightened and not mended on the head, during the time that you run your construction train?

A. I think about one-fourth; between one-fourth and one-half.

1351 12 Q. On what do you base that answer and opinion?

A. From the fact that I handled the iron, loaded the iron that was welded and cut off, and distributed it along the road, and that I also kept the account of the number of rails and the number of patches at the time. We had to make a report to the civil engineer.

13. Q. Did you say something in regard to the proportion of rails being mended on the head? What do you mean by your answer?

A. By the rails being patched on the top, or the head of the rail.

14. Q. What kind of rails do you refer to; what kind of mending do you refer to, when you say that there was one-fourth to one-half that were not patched?

A. I mean the rails that we did not mend; the patch on the head of the rails is the piece put on, welded on.

15. Q. Now, will you state again—please recollect as distinctly as possible, and state from your best recollection—what proportion, whether one-fourth, or more or less, of all the rails taken into the shop as damaged rails, were either mended in the flange, or cut off at the end, or straightened without being patched on the top; what proportion of the whole that were treated in that way and not patched on the top? That is what we desire to come at; do you understand the question?

A. Yes, sir; I think I do. Well, probably about one-fourth that was cut off, straightened, that were not patched on the top; probably about one-fourth, possibly more, but as near as I can tell. I could not tell exactly now; between one-fourth and one-half, I should think.

16. Q. Have you any recollection now, and can you state with some degree of confidence from your recollection, what proportion were mended in the flange or web and not on top?

A. I couldn't tell hardly; could not give much of an idea in that capacity.

1352 17. Q. I understand you to have stated that from one-fourth to one-half—somewhere along there—rails were either cut off, mended in the flange, or merely straightened, and not mended on the top; what was done to the rest of the rails which were not treated in that way?

A. The rest were either mended on the top or throwed into the scrap-iron for rerolling—throwed into the scrap-pile to be rerolled.

Cross-examination by Mr. Curtis:

1. X Q. I understand you to say that you did not know the proportion, at one time, of the rails that were cut off, straightened, and mended on the flange, as compared with those welded on the top; is that what you intended to say?

A. I intended to say that I knew the proportion that were cut off, straightened, and mended on the flange, at the time I was handling the rails.

2. X Q. How did you come to know that?

A. I had to make a report of the iron turned out, the amount of work done each way, the cutting off, or welding, or straightening; we had to know about that so as to know where to put them along the line.

3. X Q. Your practice then was to make a report to your engineer, in which you detailed the number of cut-off rails, and the rails that were patched and not cut off?

A. Well, we designated, I believe, the whole in the report, both the patched, cut off, straightened, and mended in the flange.

4. X Q. Did you distinguish in your reports between one and the other of them?

A. We had a form which mentioned most of those different kinds, the patching and cutting off the rail, and so forth, and we filled out the blank; that is, if the rail was twenty-one feet long, and was cut off—two feet or any length whatever—we put it down.

1353 5. X Q. And if it was patched, you reported it as a patched rail?

A. I think we did. I think there was in the report a place where we set it down—a place w'ere patched rails were put down—I think it was, to the best of my knowledge; it was some time ago, and I have not refreshed my memory.

6. X Q. These reports you sent to your chief engineer?

A. The total, when I loaded this iron—the number loaded.

7. X Q. You took careful notice of each rail?

A. Yes, sir, as carefully as I could.

8. X Q. And kept a little memorandum marked down of what were patched, cut off, mended in the flange, and so forth?

A. I marked them as they were put on the car, whether eighteen or twenty-four feet long, and about the length of patch.

9. X Q. Who was the chief engineer to whom you made these reports?

A. Mr. Paine; Charles Paine, of Cleveland.

10. X Q. How often did you send these reports in?

A. We sent in one every day. We sent in the report of the work we done. If we loaded iron, we specified what we loaded; if we did not, we made no report.

11. X Q. In giving your testimony as to what proportion of rails were mended, as described, you give the best *guess* you can, but you have no accurate account?

A. That is as near as I can give it. At the time I did know.

12. X Q. You have no accurate account on record of the number?

A. No, sir. This is as near as I can tell. It has been some time. It is as near as I can tell.

1354 Redirect examination by Mr. Niles:

18. Q. Do you desire to make any explanation in regard to any part of your evidence given in this case the other day? If so, you are at liberty to do it.

A. I do. In my statements I stated that I made a report to the civil engineer. I said that I made a report of the amount of rails moved from the rail-shop, and the amount of work done to them, which I did not, reflecting back. I did not make such a report to the engineer. I made the report to the track-master of the amount of rails brought to the shop, also the amount of rails taken from the shop—length and number of rails, designating the amount of damage to the rails taken to the shop, the amount of rails, where they were damaged, and whether they were ends or centers, as it may be.

19. Q. Was that while you were running the construction-train?
A. Yes, sir, while I was running the construction-train.

Recross-examination:

9. X Q. What did you state the other day when you were examined?
A. I believe that I stated that I reported to the civil engineer the amount of the mended rails taken from the shop, and the amount of rails delivered; but I did not reflect back; I made a report to the track-master in detail.
10. X Q. When you testified the other day you had not then reflected back?
A. No, sir; I thought it was a report to the engineer; but, looking back, I am satisfied I did not report to the engineer, except the amount of work and the car-loads of iron delivered.
11. X Q. Your former testimony, then, was inaccurate, was it?
A. Yes, sir; in that particular it was.
12. X Q. Have you read over the testimony since you gave it?
1355 A. No, sir.
13. X Q. Do you desire to change any other answer that you made before?
A. I do not.
(Signature waived by consent of counsel.)

ALBERT T. SHAW.

1. Q. Please state your name, age, residence, and occupation.
A. Albert T. Shaw; age, 53; residence, Cambridge, Mass.
2. Q. In what occupation have you been engaged for many years past, and for how many years?
A. I have been engaged in the construction and operation of railroads for thirty-three years.
3. Q. Where, and on what roads?
A. The Old Colony Road, and on the Vermont Central, and in New Hampshire, connected with the Concord & White River Junction, and Vermont & Kennebec. I was on the line from Rochester to Syracuse but a short time. I was acquainted with the construction of the road.
4. Q. Upon what road have you been more recently engaged, how long, and in what capacity?
A. I think I commenced for the Northern New Hampshire Road, in the capacity of road-master, in 1853. I think twenty years ago I was there in the capacity of road-master; my impression is it was about twenty years ago, it may not have been quite so long. I won't be positive about that. I was there in the capacity of chief engineer on that road and its branches until I left the road.
5. Q. When?
A. Last April.
6. Q. What were your duties in this position?
A. When I was road-master it was to see that the track was
1356 kept in proper repair; see to the purchase of materials for repair of the road. This was under my charge for the time.
7. Q. As chief engineer?
A. I had charge of the entire line of the Northern Road and its branches; and I had charge of the repairs of the road, drawing plans, purchasing all the timber and the materials for repairing of the road, except the iron. I did not purchase the track-iron; that the president purchased.

8. Q. Where is that road, and what is its length?

A. The road is located in New Hampshire; the Concord and New Hampshire to White River Junction on the west, sixty-nine and seven-eighths miles long; we called it seventy miles. We have a branch from Concord to Bradford, twenty-eight miles, and a branch from Haddington, about fourteen miles, and from Frankl ngton, in New Hampshire, to Bristol, New Hampshire, about fourteen miles.

9. Q. During the time of your connection with the road were you in the habit—in the practice of repairing rails; and, if so, to what extent?

A. We were; the road was. We had several fires working at repairing rails at different points, and men employed at it. There were from four to eight fires on the main line; and on the branches, I think, but one.

10. Q. Was that during the entire period of your connection with the road?

A. Yes, sir. It was for twenty years.

11. Q. What kind or kinds of block or anvil did you use for that purpose during that time?

A. We used a different block a short time; the most of time we used a plain anvil; that is, a block of iron grooved to fit the rail—what I should call a plain grooved anvil—was run at the different shops.

12. Q. A grooved anvil, was it?

A. Yes, sir; a block of iron grooved to fit the rails.

13. Q. What was the size of the block, as near as you can state?

1357 A. I should think twenty inches square; it might not have been square. I should think it might have been a little longer one way than the other.

14. Q. You have stated that in one instance you used a different machine; please state when it was, and describe that machine as nearly as you can.

A. I do not think I could state when it was; but during the time I had charge of the repairs on the road we had a jaw machine which that model represents—something like that. I should think that was the model of it. (Witness refers to a model marked "Exhibit Beebe & Smith block.") There was a man had an anvil with a jaw that he wanted set up, that this model represents; it looks like this. I set it up and told my foreman to see if it was an improvement on the common anvil. I directed the foreman of the shop to give it a trial and see.

15. Q. Please state briefly; give briefly the history of rail-mending on your road, the amount of mending done, the manner in which it was done, whether on the plain block or on this machine, and the cost per rail, without being specially interrogated on the subject.

A. Well, sir, the cost of welding rails I could not state, or the number of rails that were welded exactly, only the number of fires run. We run the fires according to the necessity of the work, and that depended on the season. During the winter when the road-bed was frozen up we did not mend so much; but in the spring we had to mend to a greater extent. During the summer season we employed a less number of fires. I should think the average number of fires that we run was three fires. We had one at Haddington. I should think the average number of these rails at these fires—my impression is—well, I could not state how many rails we did a day without looking at the reports. Some days we might do ten, or weld ten; some days twenty or twenty-two; and at the same fires I think they may have averaged fifteen, perhaps fourteen; I would not state positively.

1358 16. Q. During the period of time you continued to mend on that road what was the cost per rail of mending?

A. As near as I can guess, for twenty years the cost of mending rails varied from forty-five to seventy-five cents. I had contracts with parties to weld for fifty cents per rail; and these contracts included the furnishing of coal and labor; the road generally furnished the iron at that time. My impression is that the cost of repairing rails was somewhere from sixty to sixty-five cents each.

17. Q. What did that cost of sixty or sixty-five cents per rail include?

A. That included the patch-iron, the coal and labor and fuel. The contract price for fifty cents per rail included, on the part of the contractor, the furnishing of coal, labor, and fuel, while the road furnished the patch-iron.

18. Q. What degree of personal attention or supervision did you give to this subject of rail-mending during that time?

A. Well, I gave very good attention, I thought, to it. I was situated so that I could give attention every few days; probably every day, sometimes.

19. Q. Was it your habit to visit the shops often?

A. Yes, sir.

20. Q. How often?

A. I could not state.

21. Q. State your best recollection in regard to it.

A. Every few days; there was hardly ever more than three or four days without my being at the shop, unless I was absent.

22. Q. Was the work always done by contract, or sometimes by the day?

A. Sometimes by contract and sometimes by the day. Whenever a man thought he could make more money by taking a contract than by working by the day he would take a contract.

1359 23. Q. Did you know during the time, and do you now remember, about how much per rail the mending cost when done by the day, including the furnishing of the labor and fuel and patch-iron?

A. Well, it cost about the same as it did when done by contract. I do not think we gained much. There might have been sometimes during the year that the contractor made more, because we let the contract when the iron was mended easily, and the men gave up the contract when it was bad to mend.

24. Q. What, during that time, was the average amount of weld per rail, according to your best recollection upon the subject, and your best judgment?

A. The amount of weld in length, or the width of patch?

25. Q. The amount in length, in feet or inches, on the average.

A. I cannot state very positively; from fifteen to twenty inches weld, I think; we put on from fifteen somewhere to twenty inches; it may have been more, it may have been less.

26. Q. Now, please state fully your experience with the use of the machine which you had just had, the model which you just had in your hand, marked "Exhibit Beebe & Smith Block?"

(Objected to. It appears from the testimony already taken that the witness has not sufficient experience to make any statement except from hearsay.)

A. I had no personal experience in welding rails on the block; but, as I stated, I gave the block to my foreman, to one of the foremen, and asked him to give it a trial, and see if there was any advantage in using

it over the common anvil. I did not say this was it. I do not remember whose it was. I remember that he gave it a trial; tried several times, a little length of time, and stated that he could not weld as many rails upon it as he could upon the plain anvil.

(The complainant objects to the latter part of the answer of the witness, relating to what was stated to him by the foreman, as hearsay.)

1360 27. Q. Did you witness the experiment with it yourself?

A. I saw the foreman and the men weld upon the block with the jaws.

28. Q. For how long a time was the experiment with this machine continued?

A. I could not say the length of time.

29. Q. As near as you can remember.

A. It was one season; I could not be definite as to the time.

30. Q. Now, state the results of the experiments; how they compared with the mending of the rails on the common grooved anvil, so far as you have the means of giving an opinion. State the result.

A. I should be obliged to give what my foreman stated to me; the foreman stated that he could not weld as many rails if he was compelled to use the jaw-block as he could upon the other anvil.

(Objected to, the same as before.)

31. Q. In requiring the foreman to use this machine, had you any other purpose than to give it a thorough trial?

A. None.

32. Q. And you say it remained in the shop, you think, one season?

A. I think it was there some time.

33. Q. Please look again upon this Exhibit marked "Beebe & Smith Block;" please examine it more carefully, and state whether it actually represents the machine that you used, or does not.

A. I think it represents it; I think that is the model of it; I could not state positively that this represents it; it looks like it.

34. Q. Is that your recollection?

A. Yes, sir.

35. Q. Can you see anything in this model that differs from the machine you used?

1361 A. I cannot see anything that differs from it; that block might have been different; I cannot state; it had jaws that looked like that, and a lever which you moved by the foot.

36. Q. The other mending that you have referred to was done on the common anvil, was it not?

A. Yes, sir.

37. Q. If the price paid for mending per rail varied in different years, please state, as nearly as you can, how great the variance was, and when it was greatest.

A. I could not state positively; I should have to state from recollection. Before the war it was low; during the war it was higher; since the war it has not varied so much, neither the price of iron nor the labor.

38. Q. According to your recollection, what was the average price per bar during the war, during the time it was highest?

A. The cost per rail for repairing?

39. Q. Yes, sir.

A. I could not state positively, because I have no record here; no, I could not state positively; from forty-five to seventy-five cents; if I could not give the whole explanation of it.

40. Q. You can.

A. The president of the road required us to mend the rails, and we mended them for a time. In that climate the ground is frozen very hard during the winter, and they were obliged to put on longer patches than we could really economically weld. At these times it cost very largely, and in making up my accounts I saw that the rail-mending was done at a better profit during the summer season, when the rails were not so bad, than at the other season—the spring. A great many ends could be mended by putting in Dutchmen, which did not cost more than thirty or forty cents; and the average cost would not be far from forty-five to seventy-five cents per rail; I have no doubt we have welded rails that cost a dollar a piece.

1362 41. Q. When you mended rails that cost a dollar a piece, what was the average length per rail, as near as you can state?

A. I would state we mended in the middle and put on long patches. I could not state the length of the patches; we put on long patches.

42. Q. You remarked that your foreman did not like this machine?

A. Yes, sir.

43. Q. Did you hear any opinions expressed in connection with its use from the helpers as well as from the foreman; if so, what were they?

(Objected to as incompetent and hearsay.)

A. I do not recollect; I could not state; I did not talk very much with the helpers about the work.

44. Q. Did you ever form an opinion; if so, will you state it with respect to the cost per foot, to your company, for mending rails on the common anvil?

A. Per foot in length?

45. Q. Yes, sir; in length of patch.

A. I do not know as I figured that out; I always held that it cost more than new iron to the company, when we were figuring it up; I would say often to the president, "Here, you can buy new iron for what you are paying for mending the old rails." I used to keep pace with that; I do not know that I could answer that now.

46. When the machine referred to in your testimony, or during the time it was in your shop, had you any knowledge of any litigation in regard to it, or was its abandonment in reference to anything of the kind?

A. No, sir.

47. How distinct is your recollection about the prices paid per rail when you had rail-mending done by contract?

A. I am positive. I made the contract myself.

48. Q. And from what periods were such contracts continued?

A. I could not state.

1363 49. Q. Was it your usual practice to let contracts?

A. Whenever I could let them for fifty cents a rail I always let them. We had a standing rule that when a man wanted to mend rails at fifty cents a bar—if he mended the rails well—we would let him have the contract at that price. I do not think I could state the number of years that we contracted. It was a small part of twenty years. Mr. Sanborn has had a contract several times and given it up, then taken the contract again. I could not state the number of years except by reference to the contract.

50. Q. Were these years continuous, or at different times during this period?

A. I should think in 1865 and 1866. I looked at the books the other day. I should think I had the contract of 1865.

51. Q. At what price?

A. Fifty cents per rail.

52. Q. What was the average cost of coal during the time—the twenty years?

A. I could not state the cost during the period.

53. Q. State the cost at any one of the times when you may remember it.

A. I think we paid as high as eleven (11) dollars during the war; I cannot state positively; that is my impression, that it cost eleven dollars a ton at the close of the war. I think it cost, in Portsmouth, New Hampshire, a gross ton of twenty two hundred pounds, eleven dollars a ton.

54. Q. When you had rail-mending done by the day how did the cost compare with the cost when done by the contract, as you stated?

A. Not much different; that is, I cannot state what the difference was.

55. Q. Will you state, then, more fully, why the machine used in mending rails was abandoned?

A. The reason was because we could not weld as many rails
1364 with it as we could on the other anvil. That is what the foreman stated to me, and that is the reason why it was not used.

(The last part of this answer objected to as hearsay.)

56. Q. When this machine was tried were the men who used it mending rails by contract or by the day?

A. I could not state. I state it just as the man stated it to me. He stated to me that if he had to use that block he would give up the contract. I said "I won't force you to use any block." I told him any block he choose if he mended his rails well.

(Same objection as above.)

Cross-examination by Mr. Curtis:

1. X Q. When did you cease to act as road-master on the Northern Railroad?

A. I should think it was when I was appointed engineer. I think I stated before eight or nine years ago. I do not think I have anything to prompt my recollection. I cannot tell. Somewhere from seven to nine years ago. I intended to have brought some papers with me which were left in Boston, which might have aided me somewhat in recollecting.

2. X Q. Who became road-master after you became chief engineer.

A. John W. Richardson and Frank Richardson. I reorganized the matter and made two.

3. X Q. Where are they now, or where do they live?

A. John W. lives at Canaan, and Frank lives at Franklinton.

4. X Q. They are still acting as road-masters, are they?

A. They were road-masters the last I knew of them. I think they are now.

5. X Q. You say you are unable to answer with precision as to the number of rails mended in a day and the amount mended, and so
1365 forth. Did you have any books or records on the question which would have actually shown the facts in reference to this matter?

A. Yes, sir; we had for a number of years a monthly return. I had a monthly return from the Canaan office on a printed blank.

6. X Q. Where are those returns?

A. I left them in the Northern Railroad office in New Hampshire.

7. X Q. Did your reports show these accounts in detail?

A. No, sir; they showed the amount for repairing rails, but it was in gross.

8. X Q. Do you know a man by the name of Edward Berry?

A. Yes, sir.

9. X Q. Where did he work?

A. At Canaan.

10. X Q. While working there did you have any knowledge of his keeping an accurate account of the number of rails he mended in a day and the amount he mended on those rails, the amount of coal he burned, and so forth?

A. Yes, sir; that was his instruction from me. I had columns in the blanks for the number of rails and other items.

11. X Q. Do you know of his going up to Concord to testify in a suit of infringement of a patent machine for repairing rails?

A. I heard he had gone. I do not know.

12. X Q. Is Mr. Berry a good blacksmith himself?

A. Yes, sir.

13. X Q. What did he do in the shop?

A. Mend rails; repaired rails.

14. X Q. Worked himself upon the rails?

A. He did.

15. X Q. Who was foreman of the shop?

A. He was foreman of the shop a part of the time.

1366 16. X Q. Mr. Berry has told us that his account which he kept and sent us, showed that the average number of rails was eleven rails per day. Do you think that is probably correct?

A. I think it is probably more than that; my impression is that they would average more rails. I think that in our shop the average was nearly two thousand rails per month. In making up the account I go from recollection, and my recollection is that we welded from nine to twelve hundred rails a month, and that the Canaan shop welded somewhere about fourteen.

17. X Q. Which would be most likely to be exact, Mr. Berry's account or your recollection?

A. If Mr. Berry gave actual account it would be correct. The returns were sent to me monthly, and I have no doubt it was correct. My recollection is that we repaired thirty-three thousand per year.

18. X Q. The records would show actually what they did?

A. Yes, sir. It is my impression that is the amount.

19. X Q. Your recollection is based upon the returns, is it not?

A. Not wholly, because I had charge of that department; and I watched the expenses at that time closely, because we were very poor.

20. X Q. In making your answers do you form an opinion independent of the returns?

A. Yes, sir. That is, I know about his work in connection with the returns. I do not state positively.

21. X Q. Nevertheless, your knowledge of the mending must have been derived from the returns, must it not?

A. Partly, of course.

22. X Q. Did you use at Canaan a common bellows and open fire?

A. Part of the time.

1367 23. X Q. You paid the foreman how much?

A. I do not recollect the price. I think a dollar and seventy-five cents per day, and I think the foreman at Canaan one dollar fifty, which was increased to perhaps two dollars. I am not certain but we paid two dollars and twenty-five cents.

24. X Q. Did you pay the helpers one dollar fifty?

A. I should think we did; from a dollar to one dollar fifty.

25. X Q. How many hours per day did they work?

A. They commenced at six and left off at seven, and afterwards began at six and left off at six—eleven hours.

26. X Q. When you say that you have an impression that you mended thirty-three thousand rails, did you get that impression from anything beside the reports?

A. I could not tell you only from knowledge of our affairs and what was mended on the road. I stated that that was the whole mend on the road. I do not know about the mending at the Canaan shops; did not propose to state positively about the mend at Canaan.

27. X Q. Mr. Berry has stated that his account which he kept showed that the average mend per day amounted to nine feet; do you think he is probably right or wrong?

A. I do not think it is correct.

28. X Q. Do you think he would make an incorrect return?

A. I do not state that; I think there is some sort of mistake.

29. X Q. In stating what was done by measure for two months, would it not show the average amount?

A. It is probable or possible that he did not average upon all the rails mended.

30. X Q. He stated that he repaired eleven feet?

A. I understand; but six months afterwards he might not have mended so much.

1368 31. X Q. If he worked eleven hours in the day, and worked all the time putting on nine feet, would he not put on about the same amount of work?

A. I think he would. I think if he mended twenty rails he would put on nine feet, possibly; but on a great many rails he would not put on more than three inches.

32 X Q. In mending twenty rails he would put on how many feet?

A. I say, if he handled twenty rails with short pieces, and only ten rails with long pieces, he could weld more in length with the long pieces than he could with the short pieces of six inches.

33. X Q. Exactly. But if the company set down the number of rails from day to day for two months, they would have an average—measured the amount each day, and put that down, and found the average to be nine feet per day; that would be the test of the amount of mending?

A. That would be the test of the amount of work done for a short time. I cannot see that it would be adaptable for other portions of the report. I have been stating what I believe the report said, what I believe to be true; I have stated, I am confident, what was the true amount of mending.

34. X Q. Does Mr. Edward Berry work at Canaan now?

A. I cannot say; I think he does.

35. X Q. Do you know A. J. Badger?

A. Yes, sir.

36. X Q. He was foreman on that road?

A. Yes, sir; I think he was.

37. X Q. Where did he work?

A. At Franklinton.

38. X Q. Where is he now, if you know?

A. I could not state; my impression is that he is dead; I cannot say.

39. X Q. Who were the foremen whom you last knew?

1369 A. I do not think I could tell; we changed several times. I do not give very much attention to the mending of rails they have

done for the last five or six years; the details of it I do not think I could tell.

40. X Q. You have stated that during one period you paid one dollar seventy-five cents for foreman, did you?

A. For foreman; yes, I think we did. I think we began at one dollar fifty cents for foreman; I do not remember. I made the prices and returned the prices to the paymaster, and raised their pay afterwards to one dollar fifty for the helpers.

41. X Q. Do you know what wages you paid in 1865 and 1866?

A. I could not state; my impression is it was two dollars; it may have been two twenty-five. I think I raised their pay, or gave instructions to have it raised. I could not tell positively; very near that, however.

42. X Q. Over what years did the returns or reports that were made to you extend?

A. I could not tell you, for when I commenced we kept an account only in the gross; we did not keep it in detail until a number of years after, and the rails came in to be mended to a greater extent. I could not state what number of years.

43. X Q. Down to what period did they extend, to your present knowledge?

A. The returns were made to me as road-master. I think my clerk has them. I do not think I have looked them over within a year and a half; my clerk keeping the accounts, I only looked them over to see what the expenses were. I could not state; I presume they are kept until now.

(Signature waived by consent of counsel.)

DENNIS BRENNAN.

1. Q. Please state your name, age, residence, and occupation.

A. Dennis Brennan; age, 43; residence, Elkhart, Indiana; occupation, foreman in a rail-shop.

1370 2. Q. You have been examined before, Mr. Brennan, in this suit relating to the mending of rails, have you not?

A. Yes, sir.

3. Q. You had charge of the repair-shop on the Michigan Southern and Northern Indiana Railroad Company for a time, did you not?

A. Yes, sir.

4. Q. State between what years.

A. From 1859 until 1864—from 1858 or 1859, I am not positive which; I think 1859.

5. Q. During the time that you had charge of that shop did you cut off rails, and straighten rails, and repair rails upon the flange?

A. Yes, sir.

6. Q. Did you make use of the jaws in cutting off rails?

A. No, sir; I do not think I made any use of them.

7. Q. How were the rails cut off?

A. Chiefly cut off on the plain anvil.

8. Q. Were the jaws of any use in straightening rails?

A. I do not think we ever made any particular use of them.

9. Q. What proportion of rails during the time you had charge of the shops, in your judgment, were either simply cut off, straightened or mended upon the flange, without being patched upon the top?

A. In my opinion, fully one-fourth.

10. Q. Were the rails which you simply treated in this way included in your reports from the shop as repaired rails?

A. Yes, sir.

11. Q. What amount of mending was counted in making the reports of repairs for simply cutting off rails?

A. About six inches for cutting off rails.

12. Q. What was it for straightening a rail?

A. That depends upon what we done—some more or less, usually about six inches.

1371 13. Q. Where the rail was heated were your reports made in feet and inches?

A. Yes, sir.

14. Q. And did these items for straightening and cutting off rails and mending on the flange go into your reports as mended rails?

A. Yes, sir.

15. Q. What class of rails came to your shop for repairs?

A. All classes that were broken in any way.

16. Q. What determined you as to whether a rail should be mended by patching or whether it should be cut off?

A. Where a rail was broken on the ends we repaired it; where the flange was broken, and broken in the neck, as they were in many cases, so that it was not fit to be repaired, it was cut off. Also we got a great many rails that came in broken, so that we cut them off ten or twelve feet long.

17. Q. In all these cases these rails were included in the reports as repaired rails—mended rails?

A. Yes, sir.

18. Q. Did you at the shop mend rails which were simply broken down in the flange?

A. Wherever broken on the flange.

19. Q. What facility did you have for mending rails that were broken down in the flange?

A. We had four blocks that had a recess for receiving the rail; that is, the smooth anvil part of the block.

20. Q. Were rails put into the jaws at all for mending on the flange?

A. No, sir.

21. Q. Were these rails, thus mended upon the flange simply, included in your reports as repaired rails?

A. Yes, sir.

22. Q. How were they counted in feet and inches?

1372 A. They usually allowed six inches for putting on a flange, and in some cases where they were badly broken it might be more.

23. Q. You were in charge of this shop some four or five years?

A. Yes, sir.

24. Q. Did it often happen that rails with both flanges broken came in to be repaired?

A. Yes, sir.

25. Q. Did you repair such rails?

A. Yes, sir; where the tops were all right.

26. Q. When repaired in that way, on both flanges, how were they to be counted?

A. Wherever it took more than one heat it counted just the same as another mend; where there was a flange put on it counted six inches.

27. Q. Were you very accurate in measuring the mending upon the rails done at the shop?

A. No, sir; we were not.

28. Q. Was the mending estimated or measured?

A. My judgment is that we generally estimated.

29. Q. What, in your opinion, judging from observation and experience while in charge of the shop, would the amount actually mended by patching be in that shop per day at one fire?

A. I do not think they would exceed twelve feet.

30. Q. While they were engaged in actually patching over the surface of the rail at one fire, would other rails be operated upon in other ways; that is, by straightening, mending the flange, and cutting off the rail?

A. By that same fire, sir?

31. Q. Yes, sir.

A. I do not think that our fires averaged over twelve feet surface welding.

1373 32. Q. Were those other ways of repairing in addition to the twelve feet of solid welding, straightening the rails, and so forth?

A. No, sir.

33. Q. Do you include in that actual mending all the labor done at the fire?

A. Yes, sir.

34. Q. What has been your business since you gave up the charge of that shop?

A. Well, when I gave up the shop I took a contract on the road for getting wood.

35. Q. You have been connected with machinery for repairing on the road since?

A. Yes, sir. I sold my machine out and went to work for the company by contract for a while; working by contract some two years. I think then took charge of the Elkhart shop.

36. Q. Are they using the Bain rollers in the shop now?

A. Yes, sir.

37. Q. What other repairing of rails than those already referred to has been done to some extent in your shop? Refresh your recollection.

A. As to the amount of rails mended by patching, do you mean?

38. Q. Yes, sir.

A. Explain what that means.

39. Q. I mean where the rail is broken down right at the end, and you put in a wedge-shaped piece; some call it a dutchman?

A. Yes, sir.

40. Q. Do you use the jaws for that kind of repairing?

A. Well, not usually.

41. Q. How was that kind of mending counted?

A. We usually allowed six inches while working up the end of the iron to make up for the time lost in heating.

42. Q. Where any repairing was done to the rail, was it counted at less than six inches?

1374 A. No, sir.

43. Q. How did you make these reports?

A. To the clerk at the office, in the car department.

44. Q. I will ask you whether it did not frequently happen, in these shops, that one fire or more would be occupied in cutting rails, simply?

A. Yes, sir; very often.

45. Q. How did this form of estimating the amount of mending, to which you have referred, arise?

A. Well, it arose from men coming in from other shops and stating that they were making larger returns of the number of feet and inches, and we adopted a code for our repairs, which we intended to have kept up with other rates of work.

46. Q. Was the amount over the actual measurement or under it, in your estimate—was it chiefly estimated according to your judgment, and was it actually higher than the actual measurement would be?

A. I am of the opinion that our estimated measurement was more than the actual amount of solid welding.

47. Q. That is, the amount estimated at the shop was greater than the actual amount?

A. Yes, sir.

48. Q. Was the actual amount, measurement of the work done in the shop, deemed of importance?

A. No, sir.

49. Q. What was the actual amount of welding done where you simply put in a dutchman?

A. Not to exceed two or three inches, generally not to exceed more than one.

50. Q. How would it be in regard to mending the flange?

A. Sometimes two and a half; from two and a half to three inches.

51. Q. Would it average more than that?

A. I think, probably, it might average about three inches.

1375 52. Q. Could you assign any reason why those other estimates were made at the shop—what amount of work was expected at the shop?

A. Well, our reports were made to correspond with other records along the line, and from that custom it came to be expected that such reports would be made from the shop.

53. Q. Was there a fixed amount expected from the shop?

A. No, sir; nothing very positive.

54. Q. About what was expected to be reported from the shop?

A. We expected our men to mend from fifty to eighty or ninety inches a day.

55. Q. Was there a rivalry between the shops as to the amount of work reported?

A. Well, the men were making statements along the line that they were doing much more at other shops than we were, and our men had wanted to keep their estimates upon a level with other shops.

56. Q. Were your appliances for doing this work as good as any other shop?

A. I think they were as good.

57. Q. Was the character of the men as good?

A. I think our men were good.

58. Q. What sort of a blast did you use?

A. We had a fan-blast.

59. Q. Did you have an open fire or a furnace?

A. We had four furnaces for a time, and afterwards our shop was enlarged with about four open fires.

60. Q. What sort of blocks did you use there for rail-repairing?

A. The block used at the furnaces was a block known as the Whitcomb block; those at the fires was the Smith & Beebe machines.

61. Q. Who succeeded you in charge of that shop?

A. Mr. James Redmond.

1376 Cross-examination by Mr. Curtis:

1. X Q. When you mended rails on the flange, what sort of a patch did you put on?

A. I think we usually put on the same piece.

2. X Q. When you mended rails on the flange you place them in a

reversed position, in the jaws you used in the shop, from what you did to mend the rail on the top?

A. Yes, sir; in the block was a recess of the required shape, the rail being put in there endwise with the head down.

3. X Q. With the head down?

A. Yes, sir; with the head down.

4. X Q. Are you quite sure that you have mended rails on the flange without putting in a piece on the top?

A. Yes, sir; I am sure they would do it to some extent; I do not think that it is general, of course.

5. X Q. In making the returns which you made you meant to give a fair and honest return, and not to deceive those to whom they were rendered?

A. We were keeping an account for these reports as it was done along the line; we never considered it very accurate or important as to the exact length in inches of the patch.

6. X Q. Did the reports along the line pass through your hands?

A. No, sir.

7. X Q. How do you know, then, what was shown?

A. We only knew from the men who reported that they were repairing a great many more rails than our men.

8. X Q. Was that the extent of your knowledge in regard to that?

A. Yes, sir.

9. X Q. When directed to make returns, did you understand that these reports should be honest and true?

A. I do not know; we did not think it made any great difference as to the length of the patch at that time.

1377 10. X Q. You knew there had been orders given, did you not?

A. Yes, sir; there was orders given.

11. X Q. You have stated that the average of solid welding per day was at twelve feet; how many inches would that be?

A. About one hundred and forty-four.

12. X Q. That was about what the men were expected to do, was it?

A. Yes, sir; that is what our men done, and if they did that we never found fault with the day's work.

13. X Q. That is where they done that in solid welding?

A. I think that was in the way it was done; the men reported more number of inches in cutting off and mending broken flanges, and in straightening rails, and so forth. I made the statement as to the amount of solid welding.

14. X Q. Did you testify in open court, in Detroit, that you averaged sixteen inches patch on the rail.

A. Well, I might have made a statement of that kind; if I did, it is my opinion it was meant to count the number of inches we had figured, counting the repairs on the flanges, straightening and cutting off rails, and so forth; that was counting the cutting off and straightening at six inches each.

15. X Q. Did you ever keep an accurate account of the mending done, the number of rails cut off and straightened, as distinguished from those patched?

A. I do not remember of so doing.

16. X Q. In speaking then, of the proportion so treated, you merely make a guess at it as nearly as you can?

A. That is as nearly as I can estimate it now, it being some time since I had anything to do with it; I had no actual figures to give, but base my testimony on my judgment.

17. X Q. Have you ever measured the patches on the rails as they lay in the side-track, or taken notice of the number of cut-off or shortened rails laid down; if so, when?

1378 A. I do not know as I understand your statement. (The question read to the witness again.) I do not remember of so doing.

18. X Q. Are any of the rails repaired at the Adrian shop while you were there probably in the track now anywhere?

A. I could not say as to that, certainly.

19. X Q. Where were the most of those laid that were repaired at Adrian?

A. The most of those repaired at Adrian, I am of the opinion, are between Coldwater and Adrian.

20. X Q. Did you ever know of a mile, or thereabouts, of track being laid right along by the shop at Adrian, on the main line, for the purpose of testing the wear of repaired rails?

A. No, sir; I did not.

21. X Q. You have no recollection of its being done prior to 1861, have you?

A. Prior to 1861—I have some recollection of some rails being jumped there, and laid down as a test.

22. X Q. Describe what you mean by the term "jumped."

A. Taking two pieces, and scarfing them down, and jumping them together.

23. X Q. That was done in the machine, was it not?

A. Yes, sir.

24. X Q. The good rail could easily be distinguished as it lay in the track from one that had been mended?

A. I should say so.

25. X Q. And a patched rail can easily be distinguished, can it not?

A. Yes, sir; I should think so.

26. X Q. Is there any difference in the appearance of those, or in those rails, patched on the Bain rollers in use at Elkhart, and those patched on the machine you used at Adrian?

A. No, sir.

27. X Q. Can you tell by looking at the rails whether they were done in one way or the other?

1379 A. No, sir.

28. X Q. On what portion of the line was the iron laid which you repaired at Elkhart?

A. It was shipped to all the track-masters on the line; I think we were shipping it to nearly every trackmasters on the line.

29. X Q. Did you have charge of the shop and charge of the fire at Adrian?

A. I had charge of both at different times. I had charge of the fire and the work there by the day, and I had charge of the place.

30. X Q. Did you work by contract mending rails?

A. No, sir; not there.

31. X Q. Who worked at Adrian while you were there as helpers and as blacksmiths in mending rails?

A. I had a man by the name of John Sands.

32. X Q. Where is he?

A. He is at Adrian.

33. X Q. Who else?

A. Charles Welby.

34. X Q. Where is he?

A. He is at Adrian.

35. X Q. And who else?

A. I declare I don't remember the other ones. There was several of them; there was a man by the name of Dan O'Connor.

36. X Q. How many fires did you have there at first?

A. Four.

37. X Q. Afterwards four more were added, were they not?

A. Yes, sir.

38. X Q. How many times have you been called as a witness in regard to this matter, Mr. Brennan?

A. Do not remember of being called but once.

1380 39. Did not you give a deposition a year ago last September?

A. I gave a deposition stating the amount of work on the Bain roller, about a year ago.

40. X Q. You also testified in Detroit?

A. Yes, sir.

41. X Q. More than once.

A. That is all. I do not remember being there but once.

42. X Q. When was that?

A. It must have been in 1860. I do not know positively as to the time—1861–1862.

43. X Q. Did you go there to testify again in 1865?

A. No, sir; I think not. I do not remember being there in 1865.

Redirect examination by Mr. Jewett:

62. Q. I will ask you if, in your judgment, it is probable that any of the rails which were repaired prior to the year 1864 are now in the track or anywhere in use upon the road?

A. I could not answer that question, sir.

63. Q. Do you know about how long the average length of the life of a rail in the railroad-track of the Michigan Southern Railroad was?

A. No, sir.

64. Q. You have stated in the course of your cross-examination that when your men in the shop did fifty, sixty, eighty, or ninety inches you were satisfied with them.

A. Yes, sir.

65. Q. Explain what you mean by that.

A. Well, I mean that when they made that average run of rails repaired on the top it was counted as a fair day's work.

66. Q. Would the repairs on the flanges, the straightening of rails, and the cutting off of rails be in addition to the number of inches of solid welding?

1381 A. No, sir.

67. Q. They would not?

A. No, sir.

68. Q. Please state again as to the average amount of mending done upon the rails whilst you had charge of that shop—what it was there.

A. The average?

69. Q. Yes, sir; per day.

A. The average amount of welding on the top?

70. Q. On the top; yes, sir.

A. Ten or twelve inches.

71. Q. That is per rail?

A. Yes, sir.

72. Q. How much in the aggregate in one day's work of ten hours in length?

A. How many on the average in length?

73. Q. How much in length would the amount of welding be that was done at one fire by one set of men?

A. About twelve feet.

(Witness stated "that having had his attention called to the matter," in speaking about the number of inches per day it was fifty to ninety inches mend per day, he meant from one hundred and fifty to one hundred and ninety, and that he thought he did say one hundred and fifty to one hundred and ninety.)

(Signature waived by consent of counsel.)

CHARLES COLLINS.

1. Q. Please state your name, age, residence, and occupation.

A. Charles Collins; residence, Cleveland, O.; civil engineer by profession.

2. Q. If engaged on any railroad as civil engineer, please state what road, and in what capacity.

A. At the present time as chief engineer of the Lake Shore and Michigan Southern Railroad.

1382 3. Q. Please give briefly the history of your connection as engineer with that road, or any divisions of it?

A. I was engaged on the Cleveland and Erie Road from Cleveland, Ohio, to Erie, Pennsylvania, as assistant engineer on that road from 1849 to 1852, until the road was completed in September, 1852, in running condition. From 1852 to 1859, I think I was absent altogether about two years. During that time I acted as assistant engineer, engaged most of the time on new work. From January first, 1859, to 1868, I acted as engineer of the Cleveland and Erie Railroad. That was up to the consolidation with the Cleveland and Toledo. Portions of the years of 1868 and 1869, I acted as chief engineer and general superintendent of the line from Erie to Toledo; a portion of those two years, until C. F. Hatch was appointed general superintendent of the line. From that time I have acted as chief engineer. Upon the consolidation with the Buffalo and Erie, I was also chief engineer of the line from Buffalo to Toledo. I neglected to state, I think, that that was in 1868 or '69; '69, I think.

5. Q. During this time, what were your special duties; of what branches of business on the road did you have special charge?

A. While confined to the Cleveland and Erie Railroad I acted as not only engineer, but road-master and purchasing-agent of the road department.

6. Q. Then, after the consolidation of the Buffalo and Erie division with that portion extending from Erie to Toledo, state what were your special duties.

A. It was as chief engineer and purchasing-agent of the road department and general superintendent of the road or purchasing-agent of my department; that is, of the engineer department.

7. Q. During that time, what charge had you of the rail-mending on the road?

1383 A. While upon the Cleveland and Erie Road, I kept the account as engineer, had charge of the road-masters upon the road, and of the repairs of the rails. It was in my charge and remained so after the consolidation of the entire road from Buffalo to Toledo.

8. Q. Since the consolidation, in what way or on what sort of instrument have rails been repaired on different portions of the line?

A. They have been repaired upon what we termed the Whitcomb block and the common anvil, an anvil with two grooves, fitting the form of the rails.

9. Q. Have you a drawing of each of those instruments? if so, please produce them, and make any statement you may desire to make in regard to them.

A. I have a tracing of the drawing, which is in my office, of both of these machines; that is what I term the anvil.

10. Q. Please describe the one you term the anvil.

A. It is an iron block, eighteen inches long by seventeen and a half inches wide on the bottom, six inches in height, this secured to a wooden block—fastened to a wooden block. At the point where the rails rested upon the block, upon its side, the block is fifteen inches in width. When the rail is in its position upon its side, it has full bearing upon all the under side of the rail, leaving a space between the grooves of plain surface of seven inches in width. That, I believe, comprises the description of the block.

11. Q. Describe that portion marked "An end view," and its uses.

A. The description I have given now is a description of the end view; that is the description that I have given.

12. Q. The anvil has grooves on each side that conform to the shape of the rail, has it?

A. The anvil has two grooves, one on each side, which grooves correspond to the shape of the rail.

(This drawing is now produced in evidence, marked "Exhibit A," in this deposition.)

1384 13. Q. At what part of your road, and for how long a time, has the anvil-block, represented by this Exhibit A, been in use?

A. It is in use on the Buffalo division, and has been so long as I have been chief engineer in charge of that division of the road.

14. Q. Where is the line of that division; to what point and from what point does it extend?

A. The Buffalo division extendes from Buffalo to Erie, about eighty-eight miles.

15. Q. During what period of time have you had personal knowledge and supervision of the use of that block on that division?

A. Four months of the year 1869, and the years 1870, 1871, and 1872, and in fact up to this time.

16. Q. What instruments have been in use on the other portions of the road between Buffalo and Toledo?

A. What we have called the Whitcomb machine.

17. Q. Have you a drawing of that machine?

A. I have a tracing of that, made from a drawing in the office.

18. Q. Is this tracing now produced the one referred to?

A. It is.

(The tracing above referred to by the witness is here offered in evidence, marked "Exhibit B," deposition of Chas. Collins.)

19. Q. Look upon the model now shown you, (marked "Cleveland vise or Whitcomb machine,") bottom out, and state how that corresponds to the machine in Exhibit B, to which you have referred.

A. I should think it was like it, as near as I can observe.

20. Q. During the time of your supervision of rail-mending on the Buffalo and Erie division and other divisions, state what were the comparative facilities for mending rails other than the instruments referred to.

1385 A. On the Buffalo division the power for blast was the hand-bellows; on the Erie division, a power-blast from the steam-engine; that is, the same power that is used for other purposes furnished the blast. At Cleveland the power is from the general engine. At Norwalk it is the same. At Elmore and Elyria (these stations are upon the Toledo division) the power is given by an engine that is used for other purposes. That includes the different shops for repairing iron in which we had power for blast.

21. Q. With what degree of care and in what manner have you caused accounts to be kept and rendered of the cost of mending rails during the time referred to, and more especially since the consolidation—after the consolidation of the entire line in 1868?

A. I opened a set of books in 1859, in which I recorded all vouchers and the amount of pay-rolls which were reported all over the road to me by the different track-masters of my division.

22. Q. What was the use made of the reports sent in to your office? and, if they were copied and condensed in the books, state how it was done.

A. The amount was entered in the books, and in many instances vouchers made.

23. Q. What was your purpose in causing such accounts to be kept and rendered—recorded?

A. It enabled me to be as economical as possible, and to learn what my expenses were, and to be able to reduce my expenses, and to see that the work was done economically.

24. Q. Have you prepared from these original books and documents a tabulated statement of the results?

A. Yes, sir.

25. Q. Please produce it.

(Counsel for the complainant objects, on the ground that the original books and papers should be produced, and the statement, therefore, is incompetent.)

1386 By Mr. NILES. We now submit this paper, referred to by Mr. Collins, to be filed, and marked "Exhibit C" in the deposition of Charles Collins.

(Same objection as above.)

26. Q. Please explain fully what is shown by this tabulated statement marked "Exhibit C," and state how it was made up, from what sources, and for what purpose.

A. A portion of it was made up from pay-rolls, (some of it is by contract,) and a portion of it done at Cleveland by the blacksmith, and were both put down from the blacksmith's reports, and was written up by the master-machinist at that point every month. That constitutes all the sources from which this account was made up.

27. Q. If it was made up to show the cost of labor of repairing rails, and made up from sources that you have just named, state what was the comparative cost, as shown by the original documents, during the time indicated, of repairing rails on the different divisions of the road and by the different instruments.

(Objected to, the original documents not being produced; it being incompetent to examine a witness as to what is shown by documents that are not brought forth.)

A. The comparison commenced with the year 1869; that is the first year that I have accounts of the repairing of rails from the Buffalo division, between Buffalo and Erie. I do not fully understand whether you want me to state the aggregate of mending, or for a short time, of each division of the road.

28. Q. You may state the aggregate, and also the particulars, as far as you deem it necessary.

A. In 1869 I commenced keeping an account on the Toledo division. For that year the comparison with the Cleveland and Erie division is for the Kingsville shop, and shows forty-six cents per bar. For the Cleveland shops, on the same division, it is thirty-five and four-
1387 tenths cents per bar. For the Toledo division it is forty-four and two-tenths cents. For the year 1870 the average cost on the Buffalo division was forty-one and two-tenths cents; the Kingsville shops it was forty-two and seven-tenths; the Cleveland shop was thirty-two and six-tenths; the Toledo division was thirty-one cents. For the year 1871 the Buffalo division averaged per bar thirty-nine and four-tenths cents; the Kingsville shop was forty cents; the Cleveland shop was thirty-six cents; the Toledo division, thirty cents. For 1872 the average cost per bar on the Buffalo division was forty-four cents; the Kingsville shop, forty cents; the Cleveland shops, forty-one and three-tenths cents; the Toledo division, thirty-four and eight-tenths. That is as far as the table goes up to and including 1872.

29. Q. During that time how did the number of rails repaired on each division compare, that is, what was the comparative number of rails repaired on each division?

A. The Buffalo division for the three years to 1872 was thirty thousand and seventy bars. The Kingsville shops from 1866 to 1872 inclusive, seventy-nine thousand six hundred and sixteen. At the Cleveland shop, during the same time, forty-four thousand nine hundred and thirty-eight. On the Toledo division for the years 1869 to 1872, both inclusive, eighty-three thousand seven hundred and twenty-eight. That answers the question I believe.

30. Q. Was the entire number of rails repaired on the Buffalo and Erie division during that time, repaired exclusively on the grooved anvil-block referred to in your Exhibit A?

A. They were, sir. I want to correct what may be a misapprehension. I understand that you mean the line from Buffalo to Erie. It is generally called the Buffalo division. I don't mean the Buffalo and Erie division as it is generally termed on the road; that is, a division of the road called the Erie division; the division from Buffalo to Erie is what I mean.

31. Q. During this time, state how particularly you observed the condition of the damaged rails and the character of the repairs made
1388 to them on the different portions of your road, and whether you are able, from your own personal observation, to state whether the damage and repair was much the same on the Buffalo division as on other portions of the road.

A. I was not able to detect any difference—much, if any, difference.

32. Q. Was your personal observation sufficient to enable you to detect the difference if there had been any substantial difference?

A. I have observed it with all the opportunities I had, which was quite frequently; often in going over the road I came across iron in the track and by the side of the tracks, and I observed as to how the work was done and how much in each bar.

33. Q. How, in your judgment, did the quality of the work done compare on the different divisions?

A. I could not say that there was much, if any, difference, any further than that welded on the common block were better than that welded on the machine.

34. Q. According to a previous answer it appears that the average

cost per rail was somewhat less on certain portions of the road than on other portions. Is there any circumstance from which you can in whole or in part account for that difference? If so, state what it is.

A. It was in part affected by the power for blast, and in part by the number of rails that were cut off, and the different patterns of iron to be repaired.

35. Q. Did you ever, from your own personal observation, discover any advantage in repairing rails from the use of the jaws?

A. There may have been a little in cutting off the rail according to my observation.

36. Q. Is there any difficulty in cutting off rails on the smooth anvil?

A. We have experienced no particular difficulty.

37. Q. State how it is done on the Buffalo division.

1289 A. It is done on the plain anvil, or this anvil, which I have described with the grooves in it.

38. Q. Have you taken sufficient notice to be able to form a judgment, and if you have, state what, in your judgment, has been the proportion of rails cut off to those patched during the time referred to?

A. It varies upon the different divisions. On the Buffalo division I should say there was one-tenth—I should say—it is not by count, but in my judgment. On the Erie division I should say not far from one-fourth of the rails were cut off. On the Toledo division about one-half, in my judgment.

39. Q. What items of cost are included in the statement marked "Exhibit C?"

A. It is on all the work done, both repairing and cutting off, the cost of everything taken into the shop to be repaired—cut off or repaired—the expense is in this statement and the number of bars.

40. Q. Does it include the cost of fuel?

A. It does not.

41. Q. Does it include the cost of the new iron used?

A. It does not.

42. Q. What was probably, in your best judgment, the cost of fuel per bar, according to this statement?

A. There is no cost of fuel in that statement.

43. Q. Have you any means of forming a judgment on that subject? And, if so, state what were the means of forming such a judgment.

A. I think about six cents a bar for fuel.

44. Q. Now state what were your means of forming a judgment on that subject.

A. From the bills of purchase of fuel consumed; taking the cost from the bills of purchase of the fuel consumed.

45. Q. Were the accounts on the Buffalo division and other divisions of the road kept in the same manner and equally under your supervision?

1390 A. They were.

46. Q. Do you know Albert Congdon?

A. I do.

47. Q. In what capacity has he been employed?

A. As master machinest most of the time while employed by the company.

48. Q. Where?

A. He was stationed at Cleveland.

49. Q. State what were his special duties.

A. Taking care of the locomotive department and the machinery. Well, acting as master mechanic.

50. Q. Did he have anything to do with rail-repairing? If so, state under what circumstances and under whose direction.

A. He had charge of the shop at Cleveland, and the men there, and the men who were working part of the time on rail repairing and part of the time on other blacksmith work. The arrangement was made for the men to be under his charge in all that; and when there were not any rails to be repaired they could be in the other department, and being under his supervision, as being in the vicinity of the shops, and he being a competent man to look after them.

51. Q. To whom were the reports of rail-repairing made during the time?

A. They came in monthly statements of the proportional amount; they were sent to my office or to me.

52. Q. Are you, from your personal observation, able to form a judgment on the subject? And, if so, state, according to your best judgment, what has been the average amount in feet or inches of repairs per rail during the time rails have been repaired under your charge.

A. The reports of the rails repaired were not taken in charge by me until 1859.

By Mr. Curtis:

53. Q. 1859 or 1869?

1391 A. 1859; from 1859 up to the present time we have been reducing the amount of patching, and from 1859 to 1868, or thereabouts; I won't express myself with a great deal of positiveness, but think it would average per bar—think it might be from twelve to fifteen inches; but from that time up to the present, it is about from eight to nine inches on the Buffalo division, perhaps a little more on the Cleveland and Erie division, and less upon the Toledo division.

54. Q. In the keeping of your books and accounts of rail-repairs, had you any reference to any possible litigation, or idea that it was to be used as evidence in any suit?

A. I had not.

Cross-examination by Mr. Curtis:

1. X Q. (De bene.) When, where, and by whom was the paper, Ex-C, drawn up?

A. It was made out this week in my office under my supervision; the handwriting is that of my clerk—one of my clerks.

2. X Q. What was the clerk's name, and where is he?

A. His name is Frank Briggs; he lives in Cleveland.

3. X Q. Who made the entries in the book of record kept in your office with reference to the amount of rails?

A. I made some of them myself; others were made by my chief clerk—he was my chief clerk. From the year 1859, I think, to 1866, I would not be positive, 1866 or 1865, I made them all myself; from that time up, I had it done by my clerk.

4. X Q. (De bene.) Do your records generally show the number of bars, the average cost per bar, on the Buffalo division, prior to 1869, or including that year?

A. No, sir; I have the account for four months in 1869; for the entire year they are not in the office.

5. X Q. You could not tell, then, how many bars, or what the cost of mending was on that division for 1866–'67–'68, or prior to 1866?

1392 A. No, sir; I know nothing about it.

6. X Q. (De bene.) The work in the Kingsville shops was done by contract, was it not?

A. Yes, sir. I am speaking, sir, up to the time I had the work under my charge. I have said since the year 1859. nearly all by contract.

7. X Q. Have you in your reports the means of ascertaining the prices paid, on that division, prior to 1866, to H. Cullom?

A. There is no such man as that. I know a man named Callow; I presume you mean him.

8. X Q. We have got the name William Cullom.

A. It is a mistake. I know a man William Callow.

9. X Q. Do your records show the contracts paid to any one prior to 1866?

A. Yes, sir; they show it by the payments.

10. X Q. The same men from which reports were made in the Kingsville shops, in 1866, I suppose?

A. Yes, sir.

11. X Q. (De bene.) Why did you not produce the account back of 1866?

A. I didn't produce any statement back of 1866; that is, I have not, for the reason that some years the accounts were not satisfactory in some parts; that is the statement of repairs from 1859 to 1866.

12. X Q. Do you know how many fires were run in the Toledo division in 1870?

A. I cannot tell you. I could tell you by the records. I don't recollect the number of fires. Some years the shops run some fires that they do not now. In the Toledo shops there are none running at this time.

13. X Q. Do you know how many machines you have ever had on that division at any time mending rails?

A. The records show the number of machines at work on that division for each month.

1393 14. X Q. I don't know but what you have already stated, if so I did not correctly apprehend when, your official connection with the Buffalo division began, when you had charge of the repairing of rails or anything to do with it?

A. The last four months of 1869 the reports came to me.

15. X Q. Prior to the last four months of 1869 did you know anything about repairing on that division?

A. I did not, sir.

16. X Q. Do you know since you have had a knowledge of repairing on the Buffalo division from any actual measurement made by you, or in your presence and under your inspection, the average number of inches mended per rail on that division in any day?

A. No, sir.

17. X Q. Do you know the number of bars or rails mended in any day at one fire on that division?

A. I know nothing more than from my monthly reports of the number of days' work on the bars sent in; that is the only means. I have charged the number of bars from that; you can average the amount.

18. X Q. (De bene.) The number of days' work is not given in this statement here, is it?

A. No, sir.

19. X Q. You could have given it if you wished?

A. It could be got from the pay-roll for services rendered.

20. X Q. Were you connected with the corporation known as the Michigan Southern and Northern Indiana Railroad Company in June, 1868?

A. No, sir; had nothing to do with it in an official capacity.

21. X Q. You were aware, Mr. Collins, that suits have been commenced against the Cleveland & Erie and Cleveland & Toledo Roads, were you

not, for infringement of patent on a machine used for repairing rails?

1394 A. I didn't know that there were any suits against these particular corporations. I was aware that there were suits commenced on account of a block, but what roads were embraced in it I didn't know.

22. X Q. Do you know when you first became aware of it?

A. No, sir.

23. X Q. It was as much as three or four years ago?

A. I should think it was; think likely, sir, it was.

24. X Q. Where is your office?

A. At Cleveland.

25. X Q. (De bene.) Before abstract Exhibit C was prepared, you had an interview with Mr. Whipple or some communication from him, did you not?

A. Never.

26. X Q. At whose suggestion or request was it prepared?

A. More particularly our attorney's in Cleveland, James Mason.

27. X Q. You understood from him for what purpose it was desired to have such a statement made?

A. Yes, sir; it was prepared from the records that I had in my office, for this case, I supposed.

28. X Q. Do you know what has been the average number of rails mended per day at the Cleveland shops at any period when they have been at work there?

A. It varies somewhat; from my observation of those reports and minutes and papers, they run from fourteen to as high as twenty rails in a day, according to my best judgment now, sir.

29. X Q. (De bene.) According to your best judgment, what was a fair average day's work, in feet, in one day at one fire at the Cleveland shops?

A. I never measured, sir; I cannot give it exactly; it depends upon the number of rails cut off as to what they did.

1395 30. X Q. The master mechanic in charge of the shops would know more about that than you, would he not?

A. I think not.

31. X Q. Would he not see more of it done personally?

A. I don't know but he might; it is done partly through his foreman.

32. X Q. The foremen at the several shops on the different divisions of the road would have more actual knowledge than other persons of the actual work done at the shops, would they not?

A. It is done upon their judgment; they were not measured except in some cases; it depends upon the men's judgment.

33. X Q. Would not these foremen see and have more means of forming a judgment?

A. They would have more means of judgment, sir, I think.

34. X Q. Do you know whether as many feet of weld per day can be and is done on the common anvil, at the Buffalo division, as can be and is done upon the Whitcomb machine in use at other shops?

A. I have not measured, sir. I could not answer the question; all that I have to judge by is the reports of the number of days' work, and the number of bars repaired at the different points.

35. X Q. Who was foreman of the shop at Norwalk where rails were mended?

A. Benedict was there for a long time as foreman.

36. X Q. Can you give the prices paid to the blacksmith and helpers

from 1866 down to September, 1870, at the different points where mending has been done, as you have testified?

A. I cannot give you all the different prices that they would be paid. The prices have varied.

37. X Q. How high have you paid the blacksmith and how low?

1396 A. I think, sir, from three dollars and twenty-five cents down to two dollars.

38. X Q. When was it the highest and when the lowest?

A. I could not tell you without referring to the rolls. I don't recollect. I think, sir, three and a quarter for the blacksmith, and a dollar and a half and over for the helpers.

39. X Q. How high and how low has the pay of helpers been?

A. From twelve shillings to fifteen shillings.

40. X Q. There is a difference in the cost of labor, is there?

A. Yes, sir.

41. X Q. And a difference in the quality of help that works, too, is there not? I mean a difference in the average skill of the persons you are compelled to employ at different points.

A. We required the same skill, so far as possible, at every fire. Where we have three fires, for instance, at Elyria, we hired one man when a change was made in October, and paid him three dollars and twenty-five cents while the helpers were getting sixteen and seventeen shillings.

42. X Q. Was this change in October, 1873?

A. October, 1873. The rolls came through my office, but I cannot state positively what the wages were at different times.

43. X Q. Do you know what wages were paid on the Buffalo division to the helpers?

A. Two dollars.

44. X Q. You have three shops, with one fire in each, mending rails at Cleveland?

A. Yes, sir; only one to the shop.

45. X Q. What have you paid those helpers?

A. Those helpers were paid fourteen shillings, I think, sir. I could tell by referring to my rolls. They were reduced on the 1st of November a quarter a day; the foremen were reduced nothing.

1397 46. X Q. How does the wages paid during the current year at those shops compare with those paid during the period of the war for work of the same character?

A. I could not state positively without refreshing my memory from the rolls in my office. I think they were higher, sir.

47. X Q. Higher during the war than now?

A. I think so, sir.

Redirect examination by Mr. Niles:

53. Q. You speak of some work being done in the Kingsville shops by contract; how was the work done at the other shops—on the Buffalo and on the Cleveland and the Toledo division—by contract or by the day?

A. By the day.

54. Q. At what time were you requested by Mr. Mason to ascertain the facts to which you have testified?

A. Last week.

55. Q. Had you ever been spoken to on that subject by any person until within a few days past?

A. I have no recollection of being consulted, or asked any questions in reference to it.

(Signature waived by consent of counsel.)

Abstract of cost of labor for repairing T-rail, from 1866 to 1873.

Year of—	BUFFALO DIV. SHOPS.			KINGSVILLE SHOPS.			CLEVELAND SHOPS.			TOLEDO DIV. SHOPS.			TOTAL.		
	Repaired.		Aver'ge cost per bar.	Repaired.		Aver'ge cost per bar.	Repaired.		Aver'ge cost per bar.	Repaired.		Aver'ge cost per bar.	Repaired.		Aver'ge cost per bar.
	No. bars.	Cost.		No. bars.	Cost.		No. bars.	Cost.		No. bars.	Cost.		No. bars.	Cost.	
			Cts.			*Cts.*			*Cts.*			*Cts.*			*Cts.*
1866	.....	.....	.....	9,469	$4,355 74	46	11,912	$4,858 00	40 8-10	.....	.....	.....	21,381	$9,213 74	43 1-10
1867	.....	.....	.....	8,954	4,118 84	46	6,852	2,684 94	39 2-10	.....	.....	.....	15,806	6,803 78	43
1868	.....	.....	.....	7,758	3,568 68	46	6,804	2,217 59	32 6-10	.....	.....	.....	14,562	5,786 27	39 7-10
1869	.....	.....	.....	12,892	5,930 32	46	6,053	2,140 44	35 4-10	15,767	$6,973 71	44 2-10	34,712	15,044 47	43 2-10
1870	10,974	$4,522 99	41 2-10	11,829	5,052 42	42 7-10	5,610	1,832 66	32 6-10	18,911	5,878 35	31	47,324	17,286 42	36 5-10
1871	11,432	4,504 25	39 4-10	16,324	6,529 60	40	5,031	1,821 40	36	22,898	6,921 45	30	55,685	19,776 70	35 5-10
1872	7,664	3,371 42	44	12,390	4,956 00	40	2,676	1,106 79	41 3-10	26,152	9,113 87	34 8-10	48,882	18,548 08	37 9-10
	30,070*	$12,398 66	41 2-10	79,616	$34,511 60	43 3-10	44,938	$16,661 82	37 1-10	83,728	$28,887 38	34 5-10	238,352	$92,459 46	38 7-10

* This includes 2,872 bars that were only cut off at ends.

1399 JAMES REDMOND.

1. Q. You have been examined before in this case, have you not?
A. I have.
2. Q. Did you work with Mr. Brennan in the shops of the Michigan Southern and Northern Indiana Railroad Company at Adrian, in or about 1869?
A. I did.
3. Q. Are you connected with this shop, and have you been continuously since that time?
A. I have, and am now.
4. Q. In what capacity?
A. As foreman.
5. Q. What is the character of the repairs that have been done in that shop upon rails, since you had charge of it?
A. We have mended rails.
6. Q. In what way?
A. By patching, cutting off, straightening, mending on the flange, bending rails for turn-tables, and guard rails, etc.
7. Q. Have you still in use the same devices for mending rails that were in use when Mr. Brennan was there?
A. I don't understand you.
8. Q. Are you using the same machine?
A. I am not mending rails.
9. Q. When did you stop repairing rails?
A. I stopped in 1869.
10. Q. For what reason?
A. They shut up the rail-mending shop and stopped.
11. Q. Then will you describe the rail-repairing in that shop from 1864 to 1869?
A. Yes, sir.
12. Q. Did you use during that time the same character of machine that had been previously used by Mr. Brennan?
A. I did.
1400 13. Q. Do you know what this machine was called?
A. T-rail blocks.
14. Q. Was it a Smith & Beebe machine, or Whitcomb block?
A. The same thing as the Whitcomb block.
15. Q. Did you use these blocks for cutting off rails?
A. I did.
16. Q. Was there any advantage in the use of that machine for the purpose of cutting off rails?
A. There was.
17. Q. Did you use the jaws for cutting of rails?
A. No, sir; the anvil part of the block, as a general thing.
18. Q. Did you use the jaws for straightening rails?
A. We didn't generally use it for straightening rails.
19. Q. How did you mend flanges?
A. Heat the rail, put it into the groove, and weld on the piece.
20. Q. Didn't you employ the block in mending flanges?
A. I did; on the Whitcomb block there was an arrangement for the rail to be turned over.
21. Q. There were grooves on it?
A. Yes, sir.
22. Q. In mending flanges upon the Smith & Beebe block, what do you do?

A. There was jaws on purpose for that.

23. Q. You had to get it out of the jaws and put it in?

A. Yes, sir; I didn't mend a great many on that; I considered it awkward.

24. Q. In what way did you mend most of your flanges?

A. Most of my flanges were mended on the Whitcomb block.

25. Q. Where you had grooves on it?

A. Yes, sir.

1401 26. Q. Did you mend at that shop by putting in what was called a Dutchman?

A. Yes, sir.

27. Q. How did you make such repairs?

A. We merely cut a piece of iron called a wedge, and put in the break, and worked it up solid, welded it.

28. Q. Did you use the jaws in that process?

A. I have; yes, sir.

29. Q. How were the reports of rail-mending kept at your shop whilst you had charge of it?

A. The number of rails, and the number of inches, that is what I kept in my reports.

30. Q. Were your reports made out in that way?

A. That is the way I reported.

31. Q. To whom did you make these reports?

A. To the book-keeper at Adrian.

32. Q. Did you actually measure the amount of mending done upon the rails?

A. I think we never laid it down as we cut it off.

33. Q. How did you get at the item in feet and inches?

A. We had an arrangement for about so many inches in the amount of work.

34. Q. Was the length, in actual measurement, in feet and inches, of the amount of mending done upon the rails?

A. No, sir.

35. Q. Did you first see the rails as they came from the road to the shop for repairs?

A. I did.

36. Q. What sort of rails were included in the mass sent to the shop?

A. Just as they came in from the track; all kinds; some bad, some pretty good.

37. Q. To what extent would you cut off rails, instead of patching them?

1402 A. I would cut a rail if I found it split in the neck, or used so long that it would not be safe in the track; or if the rail was broken so it would not pay to repair it.

38. Q. What proportion of the rails were simply cut off, or simply straightened that were included in your reports of repaired rails?

A. A good many.

39. Q. What amount of mending was calculated to be equivalent to the straightening or cutting off of a rail?

A. Cutting off a rail we charged six inches; for heating and cutting off.

40. Q. How did you estimate the item of straightening?

A. About the time it would take; what we thought would be fair and correct.

41. Q. What would be the average estimate made for straightening rails?

A. I could not tell exactly. I don't know of its being ever less than six inches—six or seven inches.

42. Q. What would be the extent of repairing done to rails by putting in a Dutchman, as you call it?

A. I could not exactly tell.

43. Would it be small or large, generally?

A. I should think that all——

44. Q. You don't understand the question. What would be the extent of mending upon the rail in inches?

A. I would charge six inches.

45. Q. How much would be the actual amount?

A. From two to three inches.

46. Q. What proportion, in your judgment, of the rails which came to your shop to be mended, and which you included in your reports as repaired rails, were either cut off, or straightened, or repaired in the flange, without being patched upon the top at all?

A. I think there was one-fourth, or over, of all of these classes.

1403 47. Q. What, in your judgment, has been the amount in feet and inches, as reported from the shop, as compared with the actual amount in feet and inches of patching done upon the rails; what has been the reported amount as compared with the actual amount; has it been more or less?

A. It has been more.

48. Q. How do you account for this overestimate?

A. I expected about so many inches from a fire per day. My reports were made of the number of rails. We supposed it was necessary to return what it amounted to in inches.

49. Q. Did these reports include the estimate given of those straightened, mended on the flange, and cut-off rails?

A. Yes, sir.

50. Q. When you straightened a rail you counted it so much mending, and included it in the report or statement, did you not?

A. Yes, sir.

51. Q. In the mere straightening of a rail there is no patching?

A. No, sir.

52. Q. Whenever you cut off a rail, that is included in the statement or report as so much mending, whether you patched it in part or not?

A. We did.

53. Q. Where you mended a rail upon the flange you included that as a mended rail?

A. Yes, sir.

54. Q. Including these various ways of mending rails, straightening, mending upon a flange and cutting off, did you not, in such statement, give more feet and inches than are actually repaired upon the rails?

A. Yes, sir.

55. Q. What, in your judgment, has been the average amount of solid mending done upon the rails in your shop, per day, at one fire, since you had charge of it?

1404 A. I could not tell exact.

56. Q. I didn't ask you to tell exact, but what was your best judgment?

A. My judgment would be ten or twelve feet of solid mending.

Cross-examination by Mr. Curtis:

1. X Q. When you cut off rails at one end, didn't you sometimes patch them at the other end?

A. Yes, sir.

2. X Q. That happened not unfrequently, did it not?

A. That happened frequently.

3. X Q. When you put a Dutchman in at one end, because it was broken, you sometimes patched the other end, did you not?

A. That sometimes occurred.

4. X Q. Didn't it occur frequently?

A. Yes, sir; it occurred frequently.

5. X Q. When you straightened rails were they not sometimes put into the Whitcomb block, after being heated, and the jaws brought up two or three times to straighten them?

A. I had a machine out doors that we used for that.

6. X Q. Didn't you ever straighten them in that way on the Whitcomb block, as I have described, and then proceed to put a patch on where it was required?

A. There might have been some straightened in that way. I think probably there was.

7. X Q. Now, do you think that more than one-fourth of the rails that came into your shop did not need any patching at all on the top of the rail?

A. I think one-fourth of the rails that came into my shop didn't need any patching, or wanted so much we had to cut them off.

1405 8. X Q. You cut off more at the last end of the time you were working than you did when you first began, did you not?

A. I could not say that.

9. X Q. When you began to mend in 1864, iron was higher, and you had more reason to cut off than later?

A. I could not tell about that.

10. X Q. You say about so many inches were expected from a fire; how many inches were expected?

A. I expected from one hundred and fifty to two hundred and twenty inches; somewhere about that figure.

11. X Q. You worked by the day?

A. Yes, sir.

12. X Q. If you worked by the day, why did you find it necessary to make false returns of the number of inches per day?

A. I did not think it was necessary. I did not think it was any great matter about the number of inches at all.

13. X Q. About how many rails did you average to the fire of welded rails?

A. You mean the whole number repaired?

14. X Q. No; welded rails.

A. The number of welded rails?

15. X Q. The welded rails.

A. I could not tell exactly.

16. X Q. My question was, about how many?

A. Perhaps six rails; about five or six, I think.

17. X Q. Did you keep any accurate account, in which you distinguished between the cut-off and straightened rails and those that were patched on the machine?

A. Did I keep an accurate account of the different kinds?

18. X Q. Yes.

A. I did not at Adrian.

19. Q. It is a guess as to the number you cut off at Adrian, then, and not the result of any actual calculation, is it?

A. It is an approximate thing, about the number of inches; the number of rails were kept very accurately.

1406 20. Q. Was the number of rails cut off kept?

A. Not accurately.

Redirect examination by Mr. Jewett:

57. Q. When you speak of the number of rails welded in your shop per day, you mean at one fire?

A. At one fire.

58. Q. You had several fires in the shop?

A. Yes, sir.

(Signature waived by consent of counsel.)

JOHN MCCORMICK.

1. Q. Please state your name, age, residence, and occupation.

A. John McCormick; residence, Dwight; occupation, blacksmith.

2. Q. You have been examined before in this case, have you not?

A. Yes, sir; I was.

3. Q. What road are you now employed on?

A. I am working for the Chicago & Alton since 1862. I was working for Mr. Ragland on the road until I left him, which I think was in the spring of 1865, if I remember right, somewhere in April or May.

4. Q. Since then have you worked for the company?

A. Yes, sir.

5. Q. As blacksmith?

A. Yes, sir.

6. Q. Having charge of how many fires?

A. Two fires.

7. Q. You are still in their employ?

A. Yes, sir; working principally on frogs. I make a good many frogs.

1407 8. Q. During the time you have been so employed at mending rails, what has been the average amount of mend put upon a single rail—how many inches?

A. Well, sir, it took a great part of the time to put in what they called Dutchmen and straighten the rails. I think, sir, we didn't get over about a foot to nine inches to the rail.

9. Q. About nine inches to a foot?

A. Yes, sir.

10. Q. About how many rails did you mend in a day at a single fire?

A. Well, sir, when they done work for the company, they didn't turn out as many as where they worked by contract, because the work was done better—more substantially. The man who turns out the most rails is the best man for the contractor.

11. Q. While you worked for the company how many rails were you mending in a day—about how many?

A. We used to take account of the amount of work that was done on the rails. A good rail we put in from a foot to nine inches. We got out about from twenty-seven to twenty-eight feet of rail every day; didn't often put over two feet upon a rail. The iron used to go, I suppose, about four pounds to the foot.

12. Q. The question is, how many rails did you mend per day?

A. From ten to fourteen or fifteen, and so on. Some days we would not put out more than seven or eight, when they was bad.

13. Q. Did that include all kinds of mending, cutting off, and straightening, and mending the flanges?

A. Yes, sir; we counted cutting off and straightening; when we cut off rails they put out more.

14. Q. What proportion of the whole number were cut off and straightened and mended on the flange, without being patched at all?

1408 A. That is a pretty hard thing for a man to get at. I would think about—I think there was about one-third of the iron, or more, that never was patched; when the iron was pretty well worn out, i would not pay for patching.

15. Q. How many rails had only one patch—what proportion of the whole number?

A. I think, sir, one-half were repaired pretty much at both ends.

16. Q. About one-half?

A. Yes, sir; as near as I can state. It would go from four to six inches to the end; from that to a foot—from six inches to a foot at each end.

17. Q. Did you put in many Dutchmen?

A. Not a great many, sir; we used to once in a while; when one end would be battered down and didn't need a patch, you cut out a side of the rail and put in a piece.

18. Q. How long a patch would that make?

A. It would not be more than an inch to an inch and a half.

19. Q. Did you use the jaws for that?

A. We used to do that on the top of the block.

20. Q. On the top of the block, without the jaws?

A. Yes, sir.

21. Q. How many of them do you think you put in?

A. Well, sir, I could not say.

22. Q. Would there be one-half of the rails?

A. No, sir.

23. Q. Would there be a quarter?

A. There was a great many rails that had a little split in the end, and we used to weld them right up if they did not need any patch.

24. Q. Did you use the jaws in mending the flange?

A. No, sir; take the block and turn the rail right over; heat the rail where it needed a piece, and mend the piece on.

1409 25. Q. In the reports made to the road-master these rails were called repaired rails, were they not?

A. All, sir, that we took into the shop.

26. Q. To whom did you make these reports?

A. To the different road-masters I worked under.

27. Q. Always to the road-master?

A. Always to the road-master under whom I worked. I think I worked under some five different ones.

28. Q. You say that it takes four pounds of iron to the foot in a deposition you made before?

A. I think it takes about a pound to three inches.

29. Q. Suppose you put on only two pounds of iron to the rail, how many inches could they mend with it?

A. I think about six inches.

30. Q. I think you said in your former examination that the average mend was about eighteen inches. Did you make that statement?

A. I don't remember.

31. Q. What explanation have you now to make in regard to that?

A. I think there must be some mistake. Probably they did not understand me, or something of that kind.

32. Q. Did you ever work on any other road; if so, when?

A. I worked in 1855, 1856, and 1857, somewhere along there, on the Michigan Southern Road. I left there, I think, in the fall of 1860.

33. Q. Were you repairing rails?

A. Yes, sir. Let me see now. Mr. Collins was there, and Mr. Beckwith was chief engineer.

34. Q. On what machine were you repairing rails?

A. On the Whitcomb block.

35. Q. For whom did you work at first?

A. For Mr. Ragland first.

1410 26. Q. In what way?

A. On a contract at Elkhart.

37. Q. How much did you get?

A. Sixty-two and a half cents per rail; I think that was it. I could not state very positive; I think that is what it was. I know I had a contract there. I thought I had a big thing. I know the company furnished the material—the coal and iron.

38. Q. And you furnished the labor?

A. That was all.

39. Q. How much did you mend whilst on the road; as much or more as you have on the last road?

A. I think we did more. I think we turned out more.

40. Q. Did you do it as well?

A. I don't know as I did. I did not have as much experience. I know it was a good block. The first tool we used turned out a good deal of work for that road.

(Direct examination closed. Cross-examination deferred that the complainant's counsel could have time to examine a former deposition.)

Direct examination resumed.

By Mr. Payson:

41. Q. You stated in a former examination that a fair average day's work on the T-rail, of mending, was from eighteen to twenty-two feet each day. What did you mean; solid continuous welding of eighteen or twenty-two feet, or did it include cutting off the rails, mending on the flanges, etc.?

A. I could not say whether it was all solid iron welded right on.

42. Q. Will you state whether you could mend eighteen or twenty-two feet from day to day of solid welding aside from mending on the flanges or cutting off the rails? Do you think that would be a fair day's work?

A. It would be a pretty good day's work. I think I could do as much on that block as any other man. That would be a very big day's work.

1411 43. Q. What would be a reasonable day's work, making no allowance for any other work, in feet, of continuous welding?

A. Taking out the cutting off rails, straightening rails, putting in dutchmen, but welding solid iron?

44. Q. Solid welding?

A. Patching fifteen or sixteen feet is doing very good work, if you do it right.

45. Q. You were foreman of a fire, were you not?

A. Yes, sir.

46. Q. As such foreman did you make returns on printed blanks, tabular reports, to the road-master, of the amount of mending done and material used?

A. Yes, sir; we made returns to the road-master.

47. Q. What did those reports show?

A. The amount of iron used, and the amount of patching, amount of mending, and the amount of iron and coke.

(Objected to.)

Cross-examination by Mr. Curtis:

1. X Q. While working for the company, after you left Mr. Ragland's employ, you worked on frogs, did you not?

A. Yes, sir.

2. X Q. Did you use the machine?

A. Yes, sir; when I made frogs I used the machine for steeling frogs.

3. X Q. Could you put the point on the frog better with the machine than you could without the machine?

A. I could, because it kept the rail the original height.

4. X Q. You sometimes mended rails at both ends, didn't you?

A. If it was required, I did.

5. X Q. And sometimes in the middle?

A. Yes, sir; sometimes in the middle.

1412 6. X Q. After you left Mr. Ragland's employment, and went to work for the company, you mended a larger proportion of fish-joint rails than you did before?

A. Yes, sir; because there was more of them on the road.

8. X Q. You used to cut off rails on the common anvil, under Mr. Ragland?

A. I did sometimes, to see what I could do; I couldn't do very good work.

8. X Q. You gave testimony in regard to this in July, 1869, did you not?

A. Yes, sir; have you got it there?

9. X Q. Yes, sir, it is here; do you wish to see it? What wages did the company pay the blacksmith and helpers, while you worked for the company, after you left Mr. Ragland?

A. I got three dollars and seventy-five cents a day; the helpers got one dollar and seventy-five cents; I think Mr. Ragland paid two dollars a day.

10. X Q. What work are you engaged at now?

A. General repairing, work of that kind—a general-repairing blacksmith.

11. X Q. Did you keep any record then of the number of inches you mended?

A. No, sir; it never was required, never was called for; only the amount of rails we repaired; the rail was brought in and repaired, and put down as a repaired rail.

12. X Q. The fish-iron was heavier than the repaired rails, was it not?

A. Yes, sir.

13. X Q. It takes more labor to mend them, does it not; you cannot mend so many of them in a day?

A. No, sir; they were not so easy to handle.

14. X Q. Did you ever keep an account of the number of rails cut off, in comparison with the number of rails patched on the top?

A. No, sir; I never did.

1413 Direct examination resumed, by Mr. Payson:

48. Q. How came you to use the common anvil?

A. I use that every day now.

49. Q. I mean for mending rails.

A. I never used it, only when Mr. Ragland came into the shop to see how I could do.

50. Q. It was an experiment made at his request?

A. Yes, sir.

51. Q. Is that the only time you did it?

A. Yes, sir.

52. Q. Had you ever mended rails on the common anvil before?

A. No, sir.

53. Q. Were the frogs made by you included in the returns of rails repaired?

A. I made some frogs.

54. Q. Were the frogs included in the returns of rails repaired?

A. I always gave in the number of frogs in the rails repaired.

55. Q. In the returns of rails repaired?

A. Yes, sir.

56. Q. How many frogs did you make in a day?

A. I could not exactly tell; sometimes three; sometimes four; sometimes more. I have done as high as ten or twelve.

57. Q. What division were you on?

A. Number two. I worked at Bloomington and Springfield at one time. They sent me down to Springfield again; were going to keep me a couple of months, but kept me about eleven months. I knew I had to go where the business required.

1414 Recross-examination by Mr. Curtis:

15. X Q. You are a practical blacksmith, are you not?

A. I consider I can do as much work as anybody.

16. X Q. You consider yourself a good blacksmith, do you not?

A. I worked at it a good many years; I began when I was sixteen years of age; yes, sir.

17. X Q. You have worked on the common anvil for other purposes than mending rails, haven't you?

A. I have, sir; but not at repairing rails.

(Signature waived by consent of counsel.)

WILLIAM E. HENRY.

1. Q. Please state your name, age, residence, and occupation.

A. William E. Henry; age, 53; residence, Joliet; occupation, contractor.

2. Q. When were you road-master on the Chicago and Alton Railroad?

A. I commenced in 1864 and left in 1869.

3. Q. Where were your shops?

A. At the Summit.

4. Q. What reports were returned to you from the shop?

A. Reports of the work done from the blacksmith and foreman.

5. Q. What did that show?

A. It showed the material used; the length in feet; the iron mended; repaired by cutting off, straightening, and patching—the whole.

6. Q. What was included in the term "repaired," as used in these reports?

A. Patching the rail—patching and cutting off bad ends; punching holes, and preparing rails for the side-track.

1415 7. Q. Was every rail that had anything done to it included in that report?

A. Every rail in the report.

8. Q. What proportion of rails, reported as mended, were really mended by welding?

A. I think about one-half were mended by welding.

9. Q. What machine did you use to cut off rails?

A. They were mostly cut off on the common anvil.

10. Q. On the common anvil?

A. On the common anvil—the plain block.

11. Q. Who was foreman of your shop at the time?

A. Dan. Rooney.

12. Q. What did you do with his reports?

A. I sent his reports to the company; made what is called a road-master's report, and sent it to the chief engineer.

13. Q. How much were you in the shop?

A. Well, I was in the shop—I passed the shop, and was there every day; was in the shop, I think, on an average, daily.

14. Q. Who had charge of this whole business of patching?

A. Dan. Rooney.

15. Q. To whom were the foremen in the shop answerable?

A. Directly to me

16. Q. Then this whole business of mending rails was under your supervision, was it?

A. Yes, sir.

17. Q. How many patches were put on a rail?

A. Sometimes one, sometimes two or three; I made the practice, if the rails were badly smashed, I would cut them off and put in short lengths.

18. Q. What proportion of rails had but one patch?

A. I think there were one-half that did not have more than one patch.

1416 19. Q. How much would the patches average in length?

A. They would average six inches.

20. Q. What was the average amount per rail?

A. As near as I can say, about nine inches.

21. Q. What instructions had you as to the length of patch to be put on?

A. I instructed them what length to use, that if they could not make a weld at one heat, that it would not pay to put on a longer patch than could be put on at one heat.

22. Q. Did you so instruct the men?

A. Yes, sir.

23. Q. How many Dutchmen were put in?

A. I could not tell exactly; we mended some in that way.

24. Q. How long were they?

A. They would not exceed four or five inches.

25. Q. Was it necessary to use jaws for that purpose?

A. They used the jaws sometimes.

26. Q. What did they use the rest of the time?

A. We used the common anvil.

27. Q. When dutchmen were less than three inches in length, what did you use then?

A. I do not think they were put in the block.

28. Q. Did you have reports returned to you of the number of rails mended, and the amount of iron?

A. I had blank reports.

29. Q. Showing the number of rails and the amount of iron, with columns for the different items?

A. Yes, sir.

30. Q. What would be the amount of iron used in mending a rail?

A. It depends upon the amount of iron worn off; we used to have two and one-half inch by five-eighths inch.

31. Q. Five-eighths inch in thickness?

A. Yes, sir. I could not tell exactly how much; there was some used in trimming off.

1417 Cross-examination by Mr. Curtis:

1. X Q. Were you road-master from 1864 to 1869?

A. Yes, sir. I commenced in 1864, and worked until 1869.

2. X Q. During that period did you make or point more or less frogs?

A. Yes, sir.

3. X Q. How many?

A. We made some frogs, and Crerar, Adams & Co. made some.

4. X Q. Such frogs as you made, did you use a machine to make them in?

A. I think they used a machine partly; I could not tell you; I could not say.

5. X Q. Are frogs being made still?

A. Yes, sir. Mr. Rooney makes frogs; he was always working on frogs. I think I have seen him working on them. I could not tell upon what point he was at work. I have seen him, I think, at work making frog-points.

6. X Q. Do you know what specific machines were used there?

A. I think they had an old block there that was condemned, and the blacksmith wanted me to send him a new block something like the one used on the Illinois Central. I won't say positively about that; I do not know anything about the cost—the foreman wanted a kind of tool or swage-block.

7. X Q. How many rails do you know that you have ever measured yourself to see what their length was?

A. I have measured a great many.

8. X Q. For what purpose did you measure them?

A. For the sake of finding the length of weld and the length of the rails.

9. X Q. Have you any record, or did you make any record of the measurement?

1418 A. Nothing more than the items I took.

10. X Q. You measured the rails?

A. Yes, sir.

11. X Q. Do you now recollect any specific measurement you ever made?

A. I could not refer to it.

12. X Q. Do you recollect any measurement of the length of the patches on the rails?

A. I could not tell the length of any.

13. X Q. State the highest and the lowest.

A. Some would run from six to ten inches.

14. X Q. You never made any over two feet?

A. No, sir.

15. X Q. If such measurement had been made you would have remembered it?

A. They may have been in the total number.

16. X Q. Did you put most of the mended rails in the side track?

A. We were scarce of iron, and used it to the best advantage; we did not put many in the main track.

17. X Q. You put most of the mended rails in the side tracks?

A. Yes, sir.

18. X Q. You did not care as much about the quality of iron in the side-track?

A. We needed the best iron in the main track.

19. X Q. When you put the rails in the side track did you measure them with the same care?

A. We always picked up short rails, and put most of the shortened rails in the side track.

20. X Q. Do you now recollect to have ever seen it tested, as to how many inches could be put on in one heat on the machine you used?

A. No, sir; I never stood by for the test.

1419 21. Q. When you speak of the average weld, you speak of your recollection and present guess, but without any actual record or means of knowledge at the time?

A. There was so much of this poor iron, that I examined the iron very closely.

22. Q. Did you or do you now speak from your best guess, the very best you can make, or from any actual record or knowledge?

A. I speak from my knowledge, and knowing what came from the shop.

23. Q. Do you or do you not speak from any record or measurement, which you have examined, and which you now have?

A. Well, I think I do; these patches I have measured very often; some of them ten inches long, some shorter.

24. Q. If you are speaking from any record, where is the record; when did you last see it?

A. I have no papers. I delivered the papers to the company?

25. Q. Do you think the company now has the record showing the amount of the length of mend?

A. No, sir; I do not think there was ever anything but length in feet.

26. Q. Now, will you please reply to the question whether, in giving your testimony as to the average number of inches welded, you are giving the best guess you can, instead of any more accurate means of knowledge, or from any written record which you have examined or made at the time?

A. I think, as near as I can recollect, it would average about six inches.

27. Q. Will you please hear that last question read again, and state whether you wish to make any further answer to it?

(Objected to by the defendant as implying that the witness must either testify from the record or from a guess.)

A. I do not guess at it; I think I know from memory.

1420 28. Q. You have not yet answered the question whether you testify from any record kept by yourself or the company, or sent by yourself, specifying the number of inches welded per rail and the different kinds of mending and the amount done, or whether you testify from the best recollection or guess you can now give.

A. I make this answer from the best recollection I have.

29. Q. Was there no specified account then kept of the matter?

A. I knew nothing about this until last night, and I have had no chance to ascertain.

(Signature waived by consent of counsel.)

ANDREW REED.

1. Q. Please state your name, age, residence, and occupation.

A. Yes, sir.

30. Q. What would be the amount of iron used in mending a rail?

A. It depends upon the amount of iron worn off; we used to have two and one-half inch by five-eighths inch.

31. Q. Five-eighths inch in thickness?

A. Yes, sir. I could not tell exactly how much; there was some used in trimming off.

1417 Cross-examination by Mr. Curtis:

1. X Q. Were you road-master from 1864 to 1869?

A. Yes, sir. I commenced in 1864, and worked until 1869.

2. X Q. During that period did you make or point more or less frogs?

A. Yes, sir.

3. X Q. How many?

A. We made some frogs, and Crerar, Adams & Co. made some.

4. X Q. Such frogs as you made, did you use a machine to make them in?

A. I think they used a machine partly; I could not tell you; I could not say.

5. X Q. Are frogs being made still?

A. Yes, sir. Mr. Rooney makes frogs; he was always working on frogs. I think I have seen him working on them. I could not tell upon what point he was at work. I have seen him, I think, at work making frog-points.

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13. X Q. State the highest and the lowest.

A. Some would run from six to ten inches.

14. X Q. You never made any over two feet?

A. No, sir.

15. X Q. If such measurement had been made you would have remembered it?

A. They may have been in the total number.

16. X Q. Did you put most of the mended rails in the side track?

A. We were scarce of iron, and used it to the best advantage; we did not put many in the main track.

17. X Q. You put most of the mended rails in the side tracks?

A. Yes, sir.

18. X Q. You did not care as much about the quality of iron in the side-track?

A. We needed the best iron in the main track.

19. X Q. When you put the rails in the side track did you measure them with the same care?

A. We always picked up short rails, and put most of the shortened rails in the side track.

20. X Q. Do you now recollect to have ever seen it tested, as to how many inches could be put on in one heat on the machine you used?

A. No, sir; I never stood by for the test.

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A. There was so much of this poor iron, that I examined the iron very closely.

22. Q. Did you or do you now speak from your best guess, the very best you can make, or from any actual record or knowledge?

A. I speak from my knowledge, and knowing what came from the shop.

23. Q. Do you or do you not speak from any record or measurement, which you have examined, and which you now have?

A. Well, I think I do; these patches I have measured very often; some of them ten inches long, some shorter.

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A. I have no papers. I delivered the papers to the company?

25. Q. Do you think the company now has the record showing the amount of the length of mend?

A. No, sir; I do not think there was ever anything but length in feet.

26. Q. Now, will you please reply to the question whether, in giving your testimony as to the average number of inches welded, you are giving the best guess you can, instead of any more accurate means of knowledge, or from any written record which you have examined or made at the time?

A. I think, as near as I can recollect, it would average about six inches.

27. Q. Will you please hear that last question read again, and state whether you wish to make any further answer to it?

(Objected to by the defendant as implying that the witness must either testify from the record or from a guess.)

A. I do not guess at it; I think I know from memory.

1420 28. Q. You have not yet answered the question whether you testify from any record kept by yourself or the company, or sent by yourself, specifying the number of inches welded per rail and the different kinds of mending and the amount done, or whether you testify from the best recollection or guess you can now give.

A. I make this answer from the best recollection I have.

29. Q. Was there no specified account then kept of the matter?

A. I knew nothing about this until last night, and I have had no chance to ascertain.

(Signature waived by consent of counsel.)

ANDREW REED.

1. Q. Please state your name, age, residence, and occupation.

A. Andrew Reed; age, 52; residence, Alton; occupation, blacksmith
2. Q. How long were you so employed?
A. I started in September, 1865.
3. Q. In what capacity?
A. As blacksmith for the road-repairs.
4. Q. Does the repairing of rails come under your charge?
A. Yes, sir.
5. Q. How long did you mend rails?
A. I done it myself for about three years, and since that up to about eighteen months ago; since then another man has done that for me, but I had charge of it; seen that it was done.
6. Q. On what division of the road?
A. Number five.
7. Q. How many rails did you average a day?
A. I suppose about twelve rails would be an average day's work.
1421 8. Q. What would that include; what kind of rails?
A. That would include rails just as they came.
9. Q. What other rails did they include besides those that were patched?
A. Cut-off rails and straightened rails.
10. Q. What porportion of the whole number were not patched?
A. I would suppose that there was fully one-fourth that was not patched.
11. Q. How much patching did you do on an average to the rails?
A. About six inches would be about the average.
12. Q. What, in your judgment, would be a fair day's work of welding, counting simply the welding that was done, and not any other repairing?
A. I would suppose about eight feet.
13. Q. If you could pick out your rails and patches of just the right length, could you do more or less?
A. Certainly I could do more.
14. Q. Some witnesses in this case have talked of doing two hundred and fifty or three hundred inches of solid welding; what do you say to that, Mr. Reed?
(Objected to as incompetent.)
A. I cannot do it.
15. Q. Did you ever see anybody that did do it?
A. I did not.
16. Q. Have you ever seen any other man doing this kind of work besides yourself?
A. Yes, sir; I have worked for Mr. Huskinson; and before that I worked for Mr. Dan. Rooney; after that I was moved into that shop. Mr. Howe came there to be foreman. I worked there from September to August of the following year.
17. Q. Did any of these men that you have seen do this work do more or less than you did?
1422 A. I never saw any of them that done any more.
18. Q. Can you tell when a rail is at a proper welding-heat?
A. I think I should know. I have had a good deal of experience.
19. Q. How do you tell?
A. Just from the look of the iron; any man that is an experienced blacksmith can tell.
20. Q. How near is that heat to melting-heat?
A. Some kinds of iron stand a great deal more heat than others. There is a kind that we call glass-iron, which will fly to pieces. Take,

for instance, the Lowmoor iron; it will take a longer time to heat it, so as to weld, than will common iron.

21. Q. Now, taking the iron as you find it, how near is the welding-heat to melting-heat?

A. Just nearly melting—it has to be heated enough to amalgamate; the nearer the melting-heat so much the better.

22. Q. The nearer melting-heat you can get it the better?

A. Just so.

23. Q. How long will the iron retain welding-heat after taking it out of the furnace?

A. That depends upon the size of the iron.

24. Q. Railroad-iron, I mean?

A. If you want to weld on a piece, you could not, of course, wait long.

25. Q. What would be the effect of the jaws, in your judgment, in cooling the iron?

A. They certainly have that effect.

26. Q. Have you noticed the jaws becoming hot while in use in the process of mending?

A. Yes, sir.

27. Q. How hot do they become?

A. They become very hot.

28. Q. How near to welding-heat?

1423 A. They do not come to red heat.

29. Q. They do not come to red heat?

A. I never saw them.

30. Q. Will the jaws by getting as hot as they could get in that way—what would be your judgment about their cooling the iron when it was heated to welding-heat if it was brought in contact with them?

A. The hotter they were the less cooling effect they would have.

31. Q. Would the difference in the heat be sufficient to cool a rail rapidly?

A. It certainly would have the effect of cooling the rail—no doubt of that. I never experimented any in that respect.

32. Q. How many inches can you put on to a heat and do it well?

A. I would say eight inches or nine, to do it well.

33. Q. Have you found any difficulty in the use of your furnaces as to what amount they would heat?

A. When we first went there there was an objection to the size of the furnaces—our blast was too small, or rather, we did not have blast enough. I put a brick in each end of it, making the opening about twelve inches, and contracted it so that the blast came stronger.

34. Q. How long have you been a practical blacksmith?

A. I have been for a good many years.

35. Q. About how many years would you say?

A. I came to this country in 1852, and worked on the Chicago & Alton Railroad. I was helper before I came to this country. I worked at blacksmithing with my brother-in-law.

36. Q. How do you find yourself as compared in skill and knowledge with other men you have seen in the same business?

A. Some men has a very high estimate of themselves. It is for my employers to say whether I satisfied them or not.

1424 37. Q. Well, do you know whether you have suited your employers or not?

A. They have always paid me. I suppose they are satisfied; if they were not they would have some fault to find, I think.

38. Q. Who made out the reports of the mended or repaired rails in your shops?
A. I did.
39. Q. What did you include in the term "repaired rails?"
A. All kinds of rails that came into the shop to be repaired.
40. Q. No matter what was done to them?
A. No matter what was done to them, they were called repaired rails.
41. Q. Have you ever had any knowledge of rail-mending on other roads in this country?
A. No, sir.
42. Q. Were you in the habit of mending for other men in the employ of the Chicago & Alton Railroad?
A. No, sir.
43. Q. Did you know at that time about how much work was being done at the other shops of the company?
A. No, I did not.
44. Q. Was there anything known by the name of dutchman in your shop?
A. I know what the term means. We did not use it, because I always considered a little patch there would make a neater job.
45. Q. A dutchman is a wedged-shaped piece?
A. Yes, sir.
46. Q. And you preferred to put on a piece on the top to putting in a dutchman?
A. Yes, sir.
47. Q. Did you do much of that mending yourself?
A. Yes, sir.

1425 Cross-examination by Mr. Curtis:

1. X Q. You tried to do as good work as you could, did you not?
A. Yes, sir.
2. X Q. And you did, didn't you?
A. Yes, sir.
3. X Q. As a blacksmith you think you are competent?
A. I always made it a study to do my work to suit my employers.
4. X Q. You never had heard any complaint as to the mending of the rails on the common anvil?
A. No, sir; I did not.
5. X Q. How far from the furnaces were the rails delivered at your shop?
A. Just as near as they could get, outside of the shop.
6. X Q. How far from the furnaces, as near as you can remember? State the number of feet.
A. They were delivered about sixty-five feet from the furnaces.
7. X Q. About how far from the track where the rails were laid is it to the furnaces, where they were put into the furnaces?
A. Forty feet, I suppose; perhaps a little over, perhaps sixty feet.
8. X Q. Do you take any account of the number of rails cut off and straightened as compared with the number of rails patched?
A. All the repaired rails from the shop were returned in feet.
9. X Q. Sometimes you cut off one end and mended the other, did you not?
A. Yes, sir, sometimes.
10. X Q. You mended rails in the middle?
1426 A. Never—never patched the middle.
11. X Q. Did you make or point any frogs in your shop?
A. Yes, sir.

12. X Q. What did you do it in—in the machine?

A. Yes, sir; in the machine.

13. X Q. Did you ever keep any record showing what the average day's work was in feet and inches in your shop?

A. No, sir; never did; we kept the account always in rails, every day.

14. X Q. So far as you know, you are a competent blacksmith, are you not?

A. Well, yes; I can do the work with any other man I have ever seen yet.

15. X Q. How many inches of solid welding do you think you can put on in a day, if you tried?

A. That would depend on how the work was to be done.

16. X Q. Good fair welding on iron, how many inches could you do?

A. I would say if a man put on eight feet of welding, put it on well, he does a fair average day's work.

17. X Q. Do you think the man who could get on more than ninety-six inches would be a better blacksmith than you are?

A. It would not be a proof, if a man had to work at a disadvantage in the work he had to do.

18. X Q. You think it makes a difference whether he has long pieces to put on?

A. Yes, sir; certainly; he has more rails to carry in and more rails to carry out.

19. X Q. How long does it take you to heat a rail?

A. About seven minutes is the quickest I ever got a heat.

20. X Q. How long does it take to get a rail into the furnaces?

1427 A. That depends on the iron, if he has to get the coke in, and pile it up; there is a good many things to do.

21. X Q. Everything depends upon the furnaces and facilities for doing the work?

A. Certainly.

22. X Q. What wages have you got while you were patching rails?

A. Three dollars fifty cents per day.

23. X Q. What did your helpers get?

A. Two dollars; have got that since 1865 up to this present month; was cut down again this present month.

24. X Q. Did you know how much coal you used every day?

Q. We used coke.

25. X Q. How many bushels?

A. That depends upon the iron. We could get Pittsburgh coal, or coke; we returned that in pounds; it would take two hundred pounds per day of Illinois coal.

26. X Q. Did it take more, or less?

A. That was about the way it regularly run.

27. X Q. How much iron did it take for an average day's work?

A. That depends on how much patching we did.

28. X Q. Taking an average day's work, what was the amount of iron used?

A. Sometimes we used sixteen pounds; I never cut the iron in that way; the iron came in and was weighed, and I took down a bar and used it as we wanted it, and charged so much, according to the length we used; if I used two bars I charged so much for that day.

29. X Q. Exactly; do you know now how much iron you used, on an average, in a day?

A. I think that it would not average more than twenty pounds;

1428 that depends upon what size of iron was put on; we used two and a half by five-eighths inches; two and one-fourth by five-eighths inches. The weight we used in a day can be hardly got at; I could not do anything like justice to it.

30. X Q. Suppose it was heavier iron you were using, how would it run?

A. We used more light iron than we did heavy.

31. X Q. Yes; but I am supposing it was heavier iron; about how much did you use per day?

A. About four pounds to the foot.

32. X Q. According to the best judgment you can give, about how much do you think you used per day?

A. I do not know; I suppose it would average twenty pounds.

33. X Q. You do not think you put on more than five feet?

A. I do not suppose we did, because our orders were not to put on long patches. I do not think we put on more than five feet a day.

34. X Q. You have stated eight feet before.

A. You asked if the men were allowed to patch just for a day.

35. X Q. Who have you talked with about your testimony here?

A. I have not talked with any one.

36. X Q. You have had no conversation with any person?

A. This gentleman (Mr. Payson) asked me my opinion, and I told him just as I have done here; just as I have told the court. I came for the purpose of telling what I knew, as near as I could, in regard to what was done by me, and what others did.

37. X Q. You worked steadily right along, have you?

A. Yes, sir.

38. X Q. Who worked with you?

A. You mean as helpers?

1429 39. X Q. Yes, sir; the two men.

A. Who were they? One is Peter Burns; another is Martin Brunell, and John McKissock and Thomas Hammond.

40. X Q. Where are each of these men now?

A. Thomas Hammond is in Louisiana; McKissock is in Alton; so is the other two.

41. X Q. Where was the shop located in which you worked at mending rails?

A. Have you ever been in Alton? Well, it is right alongside the track, near the round-house.

42. X Q. In Alton?

A. Yes, sir.

43. X Q. Do you know where the rails you mended were laid, after being mended?

A. At the first time they were put into the main track; finally, after the iron became worse, they were put in the side track.

44. X Q. Whereabouts in the side track do you think they were laid?

A. They were sent to other divisions by the road-master. I had no charge of them.

45. X Q. Did you ever have any complaint that the work was not well done; that some patches came off?

A. No man can weld rails so but that some patches will come off; and sometimes where a man thinks he has a pretty good job there may be something imperfect in it.

46. X Q. Do you think that was owing to any defect in the machine?

A. That may be because the blacksmith has not done his work well.

47. X Q. Have you been over your reports to ascertain how many rails a day you averaged?

A. No, sir; but they are there given in as they were done. The reports were sent in monthly, the way the rails were done.

1430 48. X Q. Your furnaces would only heat about eight inches?

A. About twelve.

49. X Q. You could heat twelve inches; that was the width between the bricks?

A. Yes, sir.

50. X Q. How much was there in the clear?

A. I should say about that in the clear. The grate is nineteen inches, and I put in a brick at each end.

51. X Q. Flatwise or edgewise?

A. Flat.

52. X Q. How much do you think a first-rate blacksmith could heat in your furnaces and weld at one heat?

A. About eight inches would be as much as could be done. I do not suppose there could be much more.

53. X Q. If the furnaces had been built larger you could have heated more?

A. The furnace was long enough if I had had blast enough. I do not suppose a man could hammer on more at one time.

54. X Q. Did you ever try any furnaces where you heated more than you could in that, to see how much could be welded at one time?

A. No, sir; that was the biggest furnace that we had. I do not suppose it was more than nine inches across.

55. X Q. Your blast was not very good, was it?

A. Yes, sir; common bellows.

56. X Q. Common bellows?

A. Yes, sir; common bellows.

57. X Q. You worked altogether by the day, I suppose?

A. Yes, sir.

(Signature waived by consent of counsel.)

1431 THOMAS WHITE.

1. Q. Please state your name, age, residence, and occupation?

A. Thomas White; age, 40; residence, Bloomington; occupation, road-master on the Chicago & Alton Railroad.

2. Q. Division three of the Chicago & Alton Railroad?

A. Yes, sir.

3. Q. How long have you been in that position?

A. Since March, 1865.

4. Q. As such road-master what are your duties?

A. To take up and do the repairing in rails that needs to be done along the line.

5. Q. Have you anything to do with the mending of rails?

A. Yes, sir.

6. Q. Have you general supervision of that particular work?

A. Yes, sir.

7. Q. Where was the shop located?

A. At Bloomington, Illinois.

8. Q. Did you keep an account of the rails mended?

A. Yes, sir.

9. Q. What did you do with it?

A. It was sent to me by the foreman of the shops monthly.

10. Q. What did you do with that?
A. I made a copy and sent it to the chief engineer.
11. Q. How did you satisfy yourself of the correctness of these reports?
A. I generally kept a copy of them for reference.
12. Q. How often were you in the shop?
A. Sometimes two or three times a day; sometimes not every day; sometimes in there very often.
13. Q. What means of observation had you, as to the way the work was done?
1432 A. By looking on and seeing it done.
14. Q. What was done to the rails beside welding on a patch?
A. Some were cut off, some straightened, and some mended on the flange, and so forth.
15. Q. What proportion of the whole number were not patched?
A. I should think there was one-fourth of the whole number that were cut-off rails.
16. Q. What part was straightened?
A. There might be one-tenth of them straightened.
17. Q. Was there a difference made in the reports as to the patched rails, the rails cut off, and straightened?
A. No, sir.
18. Q. Were they all specified in the reports as repaired rails?
A. Yes, sir.
19. Q. The term "repaired rails" includes everything that went into the shop to be repaired, does it?
A. Everything that came to the shop to be repaired—as repaired rails.
20. Q. What proportion of rails were patched only on one end?
A. I think there was over one-half patched on one end.
21. Q. How long were the patches that you put on the rails?
A. Well, they run from four to nine and ten inches; some less.
22. Q. Some less?
A. Yes, sir.
23. Q. What would be the average amount of mending per rail?
A. The average length, for each rail, would come to about nine inches.
24. Q. Did you put any dutchmen on these rails?
1433 A. We used to put in a good many.
25. Q. How long were they?
A. It was a simple wedge, perhaps one-half inch to three inches long.
26. Q. In putting these in, do you use the jaws?
A. There was not much to do, and we generally put it in on the anvil.
27. Q. What was the avorage number of rails mended per day?
A. I think about fifteen.
28. Q. What did they include in those reports?
A. We reported the rails straightened and cut off; the amount that came into the shops.
29. Q. Were the rails ever mended on the flange?
A. Yes, sir.
30. Q. Were the rails mended on the flange included in the reports?
A. Yes. sir.
31. Q. Were they mended on the jaws?
A. No, sir; they were mended on the flat part of the anvil.
32. Q. What size of iron did you use?
A. One-half inch by two inch, two inch by five-eighths, and three-fourths by two and a fourth.

33. Q. How much does the iron weigh?

A. The five-eight's by two inches weighs about four pounds to the foot, I think, to the best of my knowledge; I had it weighed once.

34. Q. Had you any instructions as to the length of the patch?

A. No, sir.

35. Q. That was left to your own judgment, was it?

A. Yes, sir.

1434 Cross-examination by Mr. Curtis:

1. X Q. How many fires did you use for mending rails while on the road?

A. We used two a part of the time, and a part of the time only one.

2. X Q. James Flaven worked there, did he not?

A. Yes, sir; and Thomas Box.

3. X Q. Box was the foreman, was he not?

A. He was, a short time.

4. X Q. Were they good workmen?

A. Yes, sir; pretty good.

5. X Q. Did Mr. Box keep the account that was rendered to you while he was foreman of the shop?

A. Yes, sir.

6. X Q. Who came to see you about your coming here to testify?

A. When?

7. X Q. This time.

A. A gentleman from Chicago.

8. X Q. Did you have any conversation with anybody in regard to your testimony since you have been here?

A. I have been over to Mr. Payson's office.

9. X Q. Do you know Mr. Whipple?

A. Yes, sir.

10. X Q. You have talked with him, have you not, about it?

A. Not that I know of; I have not seen Mr. Whipple in three or four years.

11. X Q. You used to see him about coming to testify, didn't you?

A. Yes, sir; I saw him down at Bloomington.

(Signature waived by consent of counsel.)

1435 E. ERRICKSON.

1. Q. Please state your name, age, residence, and occupation.

A. E. Errickson; age, 37; occupation, foreman of the Wisconsin division C. & N. W. R. R. blacksmith-shop.

2. Q. How long have you been engaged as foreman and blacksmith of that shop?

A. About three years now; but I was foreman there seven or eight years ago; I have been in the Galena shops, and came back in 1860 or 1861, but have been back and forward among the two shops.

3. Q. Did you mend rails in the shops of the Northwestern Road, before the consolidation, whilst you had charge of these shops as foreman?

A. Yes, sir.

4. Q. What sort of a block or anvil did they use for the purpose of repairing rails?

A. They used the plain block; it had grooves in the side to fit the rail—to put the rail into.

5. Q. Did they ever use any other form of anvil or block for mending rails in that shop, to your knowledge?

A. No, sir.

6. Q. In 1861, when you was foreman of it, who was the blacksmith who did the work?

A. A man by the name of Dan. Stole was working there.

7. Q. Did John Sampson work there as blacksmith any portion of the time?

A. Yes, sir; I was not foreman while Sampson was working there.

8. Q. Were you working in that shop in any capacity during the time he was foreman there?

A. Yes, sir.

9. Q. In what capacity?

A. I was blacksmith; worked at the fire.

1436 10. Q. Did you notice the process of rail-mending whilst Sampson was working there?

A. Yes, sir.

11. Q. Do you know of any experiment made by him, under the direction of Mr. Anderson, for the purpose of seeing what could be done with one set of men?

A. Yes, sir.

12. Q. Do you remember, and, if so, state the result of that trial?

A. As far as I recollect, we turned out twenty-two rails a day, and put on two hundred and eighty odd inches.

13. Q. For how many days was that done?

A. About two or three days.

14. Q. After you took charge of the shop yourself, what was the number of rails, on an average per day, which you turned out from the shop?

A. Between sixteen and twenty rails a day, on an average.

15. Q. On an average how much mending, in your judgment, was there upon each rail?

A. We put on about fourteen inches to the rail.

16. Q. Did you cut off any rails at that time?

A. Yes, sir. Not so many as we do now; we cut off six or eight rails out of a day's work.

17. Q. Was there an account of rail-mending kept on that road?

A. Yes, sir.

18. Q. Was it kept in feet and inches?

A. I kept it on the slate, and gave it to the time-keeper.

19. Q. With the number of feet and inches put down?

A. Yes, sir. With the amount of iron and coal.

20. Q. And the number of feet and inches?

A. Yes, sir.

21. Q. How much did you count for cutting off rails?

1437 A. Six inches.

22. Q. Did you allow that in the count for straightening the rails?

A. We allowed six inches if we had to heat the rail.

23. Q. Six inches for every heat?

A. Yes, sir.

24. Q. Whilst you have been connected with the Chicago & Northwestern Railway Co. have they ever mended any rails upon any form of jaw block?

A. Yes, sir, at the Junction, on the Galena division.

25. Q. Have you seen any work done at that shop?

A. I have.

26. Q. What was your judgment as to the character of that work, compared with the work done on the plain block?

A. I think it was not as good. I have known rails to be taken out and put in the track that had been mended in the shop, and the patch came right off.

27. Q. You are a practical blacksmith?

A. Yes, sir.

28. Q. What reason can you give for the difference in the mending of the rails upon the two blocks?

A. You shove it into the jaws, bring them together, and put on the patch with the heavy hammers, and trim off the edge on both sides; but in the plain block we turn the rail over and weld both edges; and if the rest of the weld is not good, we find it out; but the jaws protect it in the jaw block, so that you may not see a bad weld; we never can get on so solid a weld on the jaw block.

29. Q. You never mended rails on the jaw block yourself, practically?

A. No, sir.

30. Q. How much mending have you known to be done on a single rail—how many patches on a single rail?

A. We put on twenty to twenty-five inches on a rail.

1438 31. Q. Did you sometimes patch rails both in the middle and at the end?

A. Very seldom; except the odd rails.

32. Q. Is it or not more difficult to patch a rail in the middle than at the end?

A. A little more difficult.

33. Q. What was the character of the rails which you had mended at the Northwestern shops?

A. The T-rail—the chair-rail.

34. Q. The common old-fashioned T-rail?

A. Yes, sir.

35. Q. Have you ever mended any fish-plate rails?

A. We have done it, but do not do any mending there now.

36. Q. What are the dimensions of iron that you use in patching rails?

A. Two and a half inches by five-eight's, and two and a half by one-half inch.

37. Q. Have you ever used what is called scrap-iron?

A. Yes, sir; before Mr. Anderson left.

38. Q. What do you mean by that; is it the old flat rail that was laid on the Galena division of the Northwestern Road?

A. Yes, sir; that is what I mean by scrap-iron.

Cross-examination by Mr. Curtis:

1. X Q. Was that scrap-rail worked up at the Galena division shop?

A. A very little of it.

2. X Q. Did you ever work on a jaw-block machine?

A. No, sir.

3. X Q. I understand you to have testified that you kept an account of the amount of mending done in feet and inches?

A. Yes, sir; when I was foreman of the shop.

1439 4. X Q. How long were you foreman of it?

A. Twelve or fourteen years.

5. X Q. What did you do with that account?

A. I gave it to the clerk.

6. X Q. Do you know what he did with it?

A. I do not know.

7. X Q. That was your custom right along, was it?

A. Yes, sir.

A. No, sir.

6. Q. In 1861, when you was foreman of it, who was the blacksmith who did the work?

A. A man by the name of Dan. Stole was working there.

7. Q. Did John Sampson work there as blacksmith any portion of the time?

A. Yes, sir; I was not foreman while Sampson was working there.

8. Q. Were you working in that shop in any capacity during the time he was foreman there?

A. Yes, sir.

9. Q. In what capacity?

A. I was blacksmith; worked at the fire.

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A. Yes, sir.

11. Q. Do you know of any experiment made by him, under the direction of Mr. Anderson, for the purpose of seeing what could be done with one set of men?

A. Yes, sir.

12. Q. Do you remember, and, if so, state the result of that trial?

A. As far as I recollect, we turned out twenty-two rails a day, and put on two hundred and eighty odd inches.

13. Q. For how many days was that done?

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A. Yes, sir.

18. Q. Was it kept in feet and inches?

A. I kept it on the slate, and gave it to the time-keeper.

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A. Yes, sir. With the amount of iron and coal.

20. Q. And the number of feet and inches?

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3. X Q. I understand you to have testified that you kept an account of the amount of mending done in feet and inches?

A. Yes, sir; when I was foreman of the shop.

1439 4. X Q. How long were you foreman of it?

A. Twelve or fourteen years.

5. X Q. What did you do with that account?

A. I gave it to the clerk.

6. X Q. Do you know what he did with it?

A. I do not know.

7. X Q. That was your custom right along, was it?

A. Yes, sir.

8. X Q. You returned the number of feet and inches mended?
A. Yes, sir; and so much coal and so much iron.
9. X Q. The number of rails, and the number of feet and inches of mending, and the amount of coal, were on these reports?
A. Yes, sir.
10. X Q. It cannot be true, then, that the company never had any account of their mending done?
A. They have had an account.
11. X Q. While you have been foreman you have always kept an account?
A. Yes, sir; we used to keep it on the slate, and it was left on Mr. Anderson's desk.
12. X Q. Who first spoke to you about coming here to testify?
A. There was a man spoke to me in the shop the other day.
13. X Q. Do you know his name?
A. I do not.
14. X Q. What sort of looking man is he?
By Mr. JEWETT. We will admit that it was Mr. Whipple.
15. X Q. You kept that account you spoke of when you were there working with Sampson?
A. Yes, sir; while there with Sampson.
1440 16. X Q. You did keep an account, in which you say you turned out two hundred and eighty-odd inches of mending per day?
A. We were working in the shop when we turned out the rails. Mr. Anderson kept the account of it for two or three days.
17. X Q. The account was kept right along, the same as you have testified?
A. Yes, sir. Dan Stole kept the account.
18. X Q. The number of rails, and the number of inches too?
A. Yes, sir.
19. X Q. When you worked under Sampson, do you know whether he kept the number of inches?
A. I guess he did.
20. X Q. Do you know anything about it?
A. I see it put down on the slate. I suppose he kept the account of them; he kept the account, except two or three days, when we had the trial, when Mr. Anderson kept it himself.
21 X Q. Anderson was there and kept the account when they had the trial; that was about 1861 or 1862, was it not?
A. Yes, sir; I think it was.
22. X Q. When did that gentleman, Mr. Whipple, come to see you about this matter?
A. He came up there the other day and inquired for Mr. Sampson, and I pointed out the man.
23. X Q. You were in the same shop there?
A. Sampson works there for me; I am foreman.
24. X Q. Sampson works for you, and you work for the Northwestern Road?
A. Yes, sir.
25. X Q. You testified positively that you kept an account while you were foreman there, and also kept an account while you worked there before that, of the number of rails, and the number of feet and inches mended per day?
1441 A. I could not say that, because I saw Mr. Anderson keep the account, sir.

25. X Q. I am not speaking of that particular experiment, but of your general practice in the shop?
A. I would not turn out as many inches every day.
26. X Q. But you would keep the account just the same?
A. Yes, sir; but we would not put in the same number of inches; the amount would be, perhaps, not over two hundred and fifty inches.
27. X Q. But the account would be kept just the same, whatever was the quantity?
A. Just in the same way.
28. X Q. Just in the same way, except the difference in inches?
A. Of course, the difference in inches.
29. X Q. Did you ever measure any patches, yourself?
A. Yes, sir.
30. X Q. When you were at work mending rails, was it your practice to measure the patches?
A. Not much of the time.
31. X Q. Sometimes you cut off one end of the rail and patched the other, did you not?
A Yes, sir, occasionally.
32. X Q. Did that happen quite often?
A. Not so often now as it did.
33. X Q. Now you cut off more than you used to?
A. Well, we do not mend any now.
34. X Q. During the last part of your mending you cut off more than you did before that?
A. Yes, sir.

Redirect examination by Mr. Jewett:

39 X Q. Were the general offices and shops of the Northwestern Railway destroyed in the fire?
A. Yes, sir.
(Signature waived by consent of counsel.)

1442 JOHN SAMPSON.

1. Q. Please state your name, age, residence, and occupation.
A. John Sampson; age, 39; residence, Chicago; occupation, blacksmith.
2. Q. How long have you been engaged in the blacksmithing business?
A. About twenty-four years.
3. Q. Have you ever mended railroad bars?
A. For railroads?
4. Q. Yes.
A. Yes, sir.
5. Q. Where, and for what company?
A. For the Milwaukee Company, and the Chicago & Northwestern Railroad.
6. Q. Where were the shops located in which you worked at railmending?
A. A little southwest of where they stand now—the Northwestern shops, near Erie and Halsted streets.
7. Q. In Chicago?
A. In Chicago; yes, sir.
8. Q. State what other shops you have worked at.
A. I worked for the Milwaukee division of the Northwestern Road.

9. Q. Where were their shops?
A. In Chicago; in the same place they are now.
10. Q. How long did you work at that business?
A. Twelve years, or over.
11. Q. When did you commence?
A. I could not tell you the year.
12. Q. About when?
A. I think about fifteen years ago; about fifteen years since I began to patch rails.
13. Q. What kind of anvil did you use in mending rails?
1443 A. We used a common plain cast-iron block with a groove in each side, that fitted the rail when we turned it on the side.
14. Q. How large was the block?
A. If I remember right, I think about twenty by twenty-two inches, and about ten inches thick.
15. Q. What sort of a fire did you use?
A. A common blacksmith's fire.
16. What kind of coal?
A. What we called Blossburg coal; regular blacksmith coal.
17. Q. How many men did you have at one fire?
A. Two.
18. Q. You worked yourself at the fire, as the boss?
A. Yes, sir.
19. Q. Did you cut off any rails whilst repairing them otherwise?
A. Yes, sir.
20. Q. How do you cut a rail off?
A. Cut it off, and swage up the ends.
21. Q. Do you straighten any rails?
A. Yes, sir.
22. Q. How do you do that?
A. Simply heat them and straighten them again; bend them edgewise sometimes, sometimes facewise.
23. Q. Do you know how the accounts of rail-mending were kept in that shop?
A. Yes, sir; I used to keep an account of the work, and the timekeeper used to come around and take.
24. Q. Was this an account of the mending in inches?
A. Yes, sir.
25. Q. How much was allowed for cutting off a rail?
A. Six inches.
26. Q. How much for straightening a rail?
1444 A. If we got it straightened at one head, six inches; if it took heats it would be twelve inches.
27. Q. What was the object of keeping the account in feet and inches?
A. I don't know.
28. Q. Were you mending rails by the day or by the contract?
A. I worked by the day.
29. Q. Your helpers worked by the day?
A. Yes, sir.
30. Q. Did the company furnish the materials for mending rails?
A. Yes, sir.
31. Q. What would be the difference in time, in your judgment, between putting a patch six inches in length on a rail, or cutting off the rail, where you had to heat it?
A. There would not be any.
32. Q. Then the cost would be about the same, to cut off a rail by heating or to straighten it, as it would be to put on a patch six inches long?

A. Yes, sir.

33. Q. Were you in the shops while Horatio Anderson was in the shops?

A. Yes, sir.

34. Q. Did you ever keep an account of the amount of mending done at one fire, with two helpers, during any day?

A. Yes, sir.

35. Q. How many hours did you call a day's work?

A. Ten hours.

36. Q. What was the amount of mending done at the time you kept this account, per day?

A. The best we done was two hundred and eighty-four inches. We done that in one day.

37. Q. And did you do this on the smooth anvil that you have described?

1445 A. Yes, sir; a plain block.

38. Q. How many days did you continue to keep that account?

A. Close on to a week.

39. Q. What was the amount done during the whole time per day?

A. I do not recollect, except I know that was the best we had done. We didn't quite come up to that afterwards; we done that one day; we worked just as hard other days but didn't do quite as much.

40. Q. What, in your judgment, would be a fair average day's work of rail-mending upon the smooth anvil, taking such rails as usually come into the shop for repairs?

A. Such rails as we done then about two hundred and fifty inches is about as much as I could do of them.

41. Q. You think you can do that every day right along with two good men for helping you?

A. Yes; close on to it.

42. Q. How much mending did you use to do upon a rail?

A. We didn't use to put on much over two feet on one rail; and we would do that if the rail was good.

43. Q. That is, good otherwise?

A. Yes, sir;

44. Q. In estimating this work did you count anything less than six inches?

A. No, sir.

45. Q. All patches were counted six inches?

A. All patches and a wedge.

46. Q. Could you put on a patch in about the same time you could put in a wedge and fix up the end of the rail?

A. No, sir; I could put in a wedge quicker; still, six inches was the least we counted, but I can put a wedge in quicker.

47. Q. Did you mend rails on the flange there?

A. Yes sir.

1446 48. Q. How did you do that?

A. Pretty much the same as we did the top; scarf it, cut a piece of iron the width of the flange, about five-eighths of an inch thick, weld it on the top, turn it over, and put on what we called the rib on the edge of the flange.

49. Q. What form of rails did you repair mostly in that shop?

A. Three and a half inch rail.

50. Q. The common T-rail?

A. Yes, sir.

51. Q. Did you ever mend the fish-plate rail?

A. Yes, sir; some of them.

52. Q. Could you mend that rail without difficulty on the common smooth block?

A. Yes, sir.

53. Q. What would you do to preserve the holes in their proper places?

A. I could plug up the holes until I weld the patch on, and then drive out the plugs.

54. Q. Is there any difficulty in doing this?

A. No, sir; that is, I have had no difficulty in welding this iron on that account. They are easier battered down in the neck, but you can do it and make a good job of it.

55. Q. In case you drive down the neck a little in patching, what do you do?

A. Raise it up with a fuller.

56. Q. What do you think would be the average amount of mending done upon the rails whilst you were working in that shop; how many inches per rail, on the average?

A. On each rail, it would be pretty hard to answer that. I should judge about fifteen inches, on an average, would be the highest, and the lowest about six inches.

57. Q. How many rails did you use to repair and dispose of otherwise in a day's work?

1447 A. I have got out from twelve to twenty-two.

58. Q. What would the number of rails which you would get out in any one day depend upon?

A. Depend upon? I don't know what you mean.

59. Q. Did it depend upon the length of the patch?

A. The length of the patch? Yes, sir.

60. Q. If you had short patches, or were cutting them off, you would get out more rails?

A. Yes, sir.

61. Q. Were you mending rails either on the Wisconsin division or the Milwaukee division of the Northwestern Railroad after the consolidation?

A. Yes, sir.

62. Q. Do you know whether or not the Galena division was using what was called the Cawood machine for mending rails?

A. I have been told they were fixing rails with some kind of jaw-block. I was in the shop.

63. Q. Did you notice the character of the repairs which had been done upon the block upon that division of the road?

A. Yes, sir.

64. Q. What was your judgment of the way that was done?

A. My judgment of it was that where it was done with the plain block it was better; because I have seen rails that looked to me that they would not be in a great while before the patches would be ripped off.

65. Q. How do you account for the difference in welding upon the plain block or upon the jaws?

A. That is, doing it better or worse?

66. Q. Yes.

A. With the plain block you have to weld on the top, and afterwards turn it upon the side and weld the edges; and if the piece is not

1448 welded sound, it is going to rip again and show, so that we could not pass it without knowing it. With the jaw-block they weld it

with the swage, and they trim off the edges, so that they might have some two or three inches not welded and pass it. Track-men told me, when I made these remarks, that there had been several that turned up in the track, and they had to take them up.

Cross-examination by Mr. Curtis:

1. X Q. Did you ever work on jaw-block machines of any sort?
A. No, sir.
2. X Q. Did you ever see them used?
A. Yes, sir.
3. X Q. Where did you see them used?
A. In Joliet.
4. X Q. Who by?
A. Who by?
5. X Q. Yes.
A. I could not tell you. I went into the shop and saw them using the machine.
6. X Q. Did you ever see men mending on that machine trim off anything from the edges?
A. They trimmed the combs off the edge.
7. X Q. Who did you work with when you worked for the Northwestern Road?
A. I worked with a man by the name of Cummings, and a man by the name of Antigosti, and another named Scharbana; and I worked for a man by the name of Lee Johnson.
8. X Q. Who are you working for now?
A. I am working at the Northwestern shops.
9. X Q. At what kind of work?
A. I am doing most all kinds of work. I am not patching rails, and have not been for about seven years or more.
1449 10. X Q. Were you in the habit, while working for the Northwestern Railroad mending rails, of keeping an account of the number of inches?
A. Sometimes.
11. X Q. Were you in the habit of doing so?
A. Not right along, because the time-keeper would put down the number of inches at the time; the time-keeper would take them from my slate.
12. X Q. You did then put down the number of inches, and the time-keeper took them off, did he?
A. Yes, sir.
13. X Q. Do you know Mr. Whipple, the gentleman that sits next there?
A. No, sir; I have seen him.
14. X Q. When did you first see him?
A. The first I saw of him was, I think, the forepart of this week; I saw him in my shop.
15. X Q. He talked with you about this matter then, did he not?
A. Yes, sir.
16. X Q. When was it you kept an account of ten-hours' work, and found you had mended a certain number of inches?
A. When was it?
17. X Q. Yes.
A. I don't recollect the date; it was in 1861 or 1862; it was at the time that this lawsuit was coming off in Detroit.
18. X Q. It was kept by request, in connection with that lawsuit?

A. Yes, sir; to see what we could do then; but we always kept an account of the rails, before that and after.

19. X Q. Did you work in the shop that day, when you mended that number of inches at a fire?

A. Yes, sir.

20. X Q. Who was helping you?

A. I had one man, named Lowe.

1450 21. X Q. Who else?

A. The other man, I don't know his name.

22. X Q. Where is the other man?

A. I could not tell you, sir; it was a long time ago.

23. X Q. How many inches did you mend?

A. At that time?

24. X Q. Yes, sir.

A. Two hundred and eighty-four was the best we done.

25. X Q. What did you do with that account?

A. I left it on my slate, and the time-keeper took it.

26. X Q. Was Scharbana working there at the time this was done?

A. Yes, sir; he was my foreman.

27. X Q. How many fires did you have in that shop for repairing rails?

A. There was only one.

(Signature waived by consent of counsel.)

CHARLES PAINE.

1. Q. Please state your name, residence, and occupation?

A. Charles Paine; residence, Cleveland, Ohio; occupation, general superintendent of the Lake Shore and Michigan Southern Railroad.

2. Q. Were you formerly connected with the Michigan Southern and Northern Indiana Railroad Company; and, if so, when, how long, and in what capacity?

A. I was superintendent of the western division of the Michigan Southern and Northern Indiana from August, 1853, until December, 1863; then I became chief engineer of that company, and continued in charge of those lines until April, 1872. I was chief engineer. After the consolidation I still retained these lines as chief engineer.

3. Q. What knowledge had you in regard to the preparation of the reports of rail-mending on that road during your connection with it?

1451 A. I assisted in making all the reports after I came on the road—after August, 1858.

4. Q. Were all of the rails cut or mended in the flange, or in any other way reported separately, so as to show what was done to them, or altogether, simply as mended rails; or how were they reported?

A. They were reported altogether, without distinction.

5. Q. What has become of the original documents from which the reports were made?

A. All destroyed in the Chicago fire.

Cross-examination by Mr. Curtis:

1. X Q. Were these reports, I mean the original reports, returned to you during the period you speak of assisting in making the reports?

A. Returned to the general office.

2. X Q. The road-master's reports, were they returned to the general office?

A. The reports of foremen were sent to the general office.

3. X Q. Where was the main office, or where was it during that period?

A. It was at Toledo, and afterwards at Chicago.

4. X Q. Who actually made up the reports of rail-mending; who actually entered them on the records, the reports of the repairing of rails from the foremen of the shops; in whose handwriting were they?

A. The reports of the foremen of the shops?

5. X Q. No; the reports you made up from the reports of the foremen?

A. I did the larger part of it myself most of the time. I could not say that I did it all; I generally condensed these reports myself; that is the function I had.

6. X Q. Did these reports show any specific proportion of rails,
1452 or number of rails that were cut or straightened, or mended in any other way than being patched upon the top of the rail?

A. They included everything.

7. X Q. But made no distinction?

A. Made no distinction.

8. X Q. And they did not state whether they were mended in one way or another?

A. No, sir.

CHARLES PAINE.

DAN ROONEY.

1. Q. Please state your name, age, residence, and occupation.

A. Dan Rooney; age, 46; residence, Summit; occupation, blacksmith.

2. Q. You have been examined once before in this case, have you not?

A. Yes, sir.

3. Q. On what road are you now employed?

A. The Alton and St. Louis road.

4. Q. As foreman of the fire for mending rails?

A. I am not foreman now. I was.

5. Q. For mending rails?

A. I was foreman. I make frogs now. I was foreman then, and done repairing.

6. Q. How often were you there in the shop?

A. I was there very steady. I am thirteen years working for the company.

7. Q. When did you commence mending rails in that shop? How soon after you went there?

A. I was not foreman at the start. They got a block there—they used a block twelve years ago.

8. Q. Do you remember when you became foreman?

A. In what year?

1453 9. Q. Don't you remember the year, in what year?

A. I cannot tell the year.

10. Q. As near as you can state it.

A. I was about eight years foreman, out of the thirteen years, as near as I can guess.

11. Q. Whilst rails were being mended in that shop, what was the average number per day mended at one fire?

A. We repaired from ten to (some days) eighteen, as high as eighteen; but the average would not amount to more than twelve.

12. Q. You think the average is about twelve?

A. Pretty near twelve.

13. Q. What did they include in the reports of repaired rails?

A. Cut off, straightened, putting wedges in, a little piece—what you call a Dutchman.

14. Q. How much did they put on, on a single patch?

A. From two inches up to a foot.

15. Q. How much would it average to a rail of solid welding?

A. The whole mend of solid welding would be between four and six inches of solid welding.

16. Q. On your former examination you say that the average amount of mending to the rail would be about twelve inches at each end. What do you say to that now?

A. I meant six inches at each end.

17. Q. Twelve inches in the whole?

A. Six inches at each end; that is, put on twelve inches; we sometimes, but scarcely ever, put on over a foot. The road-master stated that it would not pay to put on a foot in a single mend at all.

18. Q. What proportion of rails were mended only at one end?

A. There was nearly one-half; some places nearly one-half were mended at one end.

1454 19. Q. What proportion of all the rails were cut or straightened only?

A. What proportion do you mean were cut of those turned out on an average?

20. Q. Out of the whole number?

A. I should think out of the whole amount of repairing the straightened and cut-off rails will be about—I will say one-third of them, I think, as near as I know.

21. Q. In the returns of repaired rails what was included, what kind of rails?

A. My report to the road-master was—I would carry out the rail, in the report, whatever was done to it, whether straightened, or I put in a wedge, or patched it; whatever was done I returned it, and called it a repaired rail. We called them repaired rails, no matter what was done to them; whether straightened or cut off, or whatever we done to them, we called them repaired rails.

22. Q. You stated in your former examination that you formerly put on, as an average day's work, from one hundred and eighty to two hundred and fifty inches; what do you say to that now?

A. There must have been a mistake there—there must have been a mistake; we used to count six inches for cutting off rails that was not patched at all.

23. Q. Did you swear to that?

A. Well, I did not mean to swear to that, when I said that; we called it six inches, for each rail that was cut off; that was allowed there before, and we put it in our return to the road-master; that was the way we done it.

24. Q. Did you put in any Dutchmen?

A. Yes, sir; lots of them.

25. Q. How long do they measure?

A. From one inch to two and one-half inches; some of them three inches.

1455 26. Q. In putting in Dutchmen, was it necessary to use the jaws?

A. Not at all; we mended them on the anvil.

27. Q. How much did these Dutchmen count in your reports?

A. The Dutchmen we used to call six inches, for our bother in heating; if we only heated it once, we just called it six inches.

28. Q. Were any frogs made at your shop?

A. Yes, sir.

29. Q. Did you use the jaws in making frogs?

A. We used them for steeling the top of the iron of the rail; we did not use them very often.

30. Q. How many times have you used them in that way?

A. About a dozen times, for steeling; we would put the wings of the frogs on without them.

31. Q. What was the size of the iron you used?

A. We used different sizes, one-half inch by two inches, five-eighths by two inches, and three-fourths by two inches.

Cross-examination waived.

(Signature waived by consent of counsel.)

GEORGE WAGNER.

1. Q. Please state your name, age, residence, and occupation.

A. George Wagner; age, 39; residence, Hudson, Mich.; occupation, blacksmith.

2. Q. Have you ever been in the employ of the Michigan Southern & Northern Indiana Railroad Company?

A. Yes, sir.

3. Q. When, and how long, and where?

A. I think the first time I went to work it was in 1855; I cannot tell exactly—in 1855 at Adrian, Michigan, one year, and nine years at Hudson.

1456 4. Q. What were you doing when you worked for the company?

A. I worked one year at repairing engines, and nine years mending rails and tools for the road.

5. Q. When you were mending rails at Hudson, what kind of blocks did you use for your mending there?

A. First, we had two flat blocks with a swage in each side that fitted the side of the rails; about two years after we had another, a kind of lever block.

6. Q. Look at this machine, marked "Cleveland vise, or Whitcomb machines," and state whether that is like the one you used?

A. No, sir, my jaws are round and not square.

7. Q. Did it have a movable part like this? (referring to the Cleveland vise.)

A. Yes, sir.

8. Q. How were the jaws moved, backward and forward?

A. Moved like that, but this is a different model; I think it moves up and down—(indicating)—a different model.

9. Q. Did it have one fixed and one movable jaw?

A. Yes, sir; one fixed and one movable jaw.

10. Q. How long was that used at the shop at Hudson, during the nine years that you worked there?

A. That was used about five years to my recollection.

11. Q. How long was the smooth anvil-block used?

A. About four years.

12. Q. How many years did you use both together?

A. About four years we did work on the smooth anvil, and during the rest of that time we used the lever-block.

13. Q. Did you use the lever-block?

A. I worked some on it, another man worked on it; my brother, Mike Wagner, he worked some on it.

14. Q. What did he do?

A. He mended rails.

1457 15. Q. What part of the work did he do?

A. He mended rails.

16. Q. What part of the work of mending rails did you do?

A. Oh, I make the heat; heated the rails and heated the iron.

17. Q. Did you work on the smooth block, and at the same fire?

A. Yes, sir.

18. Q. While you were working on the smooth block, he was working on the jaws?

A. Mr. Harmes.

19. Q. Had you more than one smooth anvil in the shop?

A. Two, some part of the time.

20. Q. Were both working on it part of the time?

A. Yes, sir; the two.

21. Q. When you were working on the smooth block, what kind of blacksmith was the other man who was working on the jaws?

A. He was a good blacksmith; a good workman.

22. Q. Now, do you remember and will you state who did the most of the work during that time—you and your helpers on the smooth block or the other man on the jaws?

A. I can do more than they can do on the jaws.

23. Q. Did you do more?

A. Yes, sir.

24. Q. How much more a day were you in the habit of doing?

A. One or two rails, somewhere there, some days.

25. Q. Was your work done as well as that on the jaws?

A. Yes, sir.

26. How long have you yourself worked on the jaws, do you think?

A. About four or five years; somewhere there.

27. Q. Now, from your experience with both machines, will
1458 you state what the difference between them is in results as to doing good work and the amount of work you can do?

A. I do not know as there is much difference. The jaws do not do me a great deal of good. I had just as soon have the smooth block as the jaws.

28. Q. Can you now do as much work on the smooth block as on the jaws?

A. Yes, sir.

29. Q. Are you certain, from your use of both, as to that?

A. Yes, sir.

30. Q. What is the most important matter in mending rails well and rapidly?

A. I think if you have a good heat and take your hammer and pound the iron on that it will stay on, but if welded in the jaws I think it will fly off sometimes.

31. Q. Describe the process of mending a rail. What would you do to it? What is the first thing you do to a rail that has to be mended?

A. I take the rail, hang it here in the chain, put it into the fire, heat it, take it out, put it on the block, take a chisel and chip it off ready for the iron, then put it back into the fire and raise the heat and mend it on.

32. Q. Did you use the jaws sometimes or the smooth block all the time?

A. Sometimes I took the jaws and sometimes I did not.

33. Q. Which way can you make the best patch—to cut off the broken part of the rail, as you first described, or to put on a patch without cutting off?

A. I can make the best job of it if I take a chisel and cut it off smooth, raise the heat, and weld it right on.

34. Q. Do you remember how many rails a day used to be mended by you on the common anvil, and how many by the other men on the jaws, when you worked in the same shop, side by side—about how many a day?

A. Yes, sir; from eighteen to twenty rails a day, according how the rails was.

1459 35. Q. How long do you say you worked side by side?

A. In the shop?

36. Q. Yes, sir.

A. We worked there somewheres about seven or eight years. I was there about a year and a half alone, with one fire.

37. Q. Did you cut any rails instead of mending them by patching?

A. Sometimes.

38. Q. Did you mend any on the bottoms?

A. Not many.

39. Q. Did you straighten some without patching them?

A. Yes, sir.

40. Q. Who was road-master of that division of the road during the time you have spoken of—the nine years you worked at Hudson?

A. The first was Mr. Touel Finnegan, the next was Henry Hervying, the next was H. J. Corbus.

41. Q. How long a patch did you commonly put upon the rail when you patched the top?

A. About from six to ten inches, along there—eight to ten inches.

42. Q. Did you ever put in a wedge in the corner?

A. Yes, sir.

43. Q. How long a mend do you make in such a case?

A. Six inches. I count six inches by putting in a wedge.

44. Q. You mean, then, that you count six inches; what was the actual mend—how many inches actual mend?

A. About from two to three inches.

45. Q. When you say that you mended from eight to ten inches, do you mean that that was the actual length of patch that you put on?

A. That was the piece I put on, and if that did not mend it I put on a longer piece.

46. Q. How many inches can you mend at one heat—at one fire?

1460 A. From eight to ten inches.

47. Q. How much longer would it take to put on a patch eight or ten inches than one four or six inches long?

A. It would not take any longer; the same time—not much longer.

48. Q. When you say that you mended eighteen or twenty rails in a day, did you include those that you mended with the wedge, and those that you cut off, and those that you straightened or did anything to whatever, as well as those you patched on the top?

A. Yes, sir.

49. Q. Included them all?

A. Not if I did not have to heat them; some rails wanted to be straightened, and I straightened them without heating; if I heated them I counted six inches for it.

Cross-examination by Mr. Curtis:

1. X Q. For what corporation are you now working?
A. For a corporation in Pittsfield.
2. X Q. What is the name of it?
A. In the town of Pittsfield.
3. X Q. What is the name of the parties you work for?
A. I work for Mr. Wagner.
4. X Q. What is the other name?
A. George Wagner.
5. X Q. You are working for yourself, are you?
A. Yes, sir.
6. X Q. You do not work for any company?
A. No, sir.
7. X Q. When did you cease to work for the company?
A. When I left last—about seven years ago last August or September.
8. X Q. Seven years ago last September?
1461 A. Yes, sir; I think so.
9. X Q. How many inches can you put on, solid welding, in a day?
A. One hundred and twenty inches in a day.
10. X Q. Is that as good as you can do?
A. Yes, sir.
11. X Q. You think that would be a fair day's work for any man?
A. I think so.
12. X Q. You never worked for any railroad in repairing rails except on the Michigan and Southern Road, did you?
A. That is all.
13. X Q. Who came to you about coming out here to testify?
A. Mr. Cooper sent word to me that I had to come to Chicago, and he sent me a pass.
14. X Q. He sent you word that you had to come to Chicago?
A. Yes, sir.
15. X Q. And you came after he sent you word you had to come?
A. Yes, sir.
16. X Q. How many years did you use the smooth or plain anvil-block?
A. I think I used the smooth block about five years, and about four years the lever-block, by my recollection.
17. X Q. Where did you learn your trade?
A. In Germany.
18. X Q. Did you keep account of the number of rails you welded in each day?
A. Yes, sir.
19. X Q. What did you do with it?
A. The first part of the time I sent it in once a month; afterwards we sent it in once a week; so many inches, so many feet, and so many rails.
1462 20. X Q. You were in charge of the fire?
A. Yes, sir.
21. X Q. You made a report of the matter yourself, did you?
A. Yes, sir.
22. X Q. So many inches, so many feet?
A. Yes, sir.
23. X Q. What wages did you get?

A. I got thirteen shillings; at last I had, I guess, about two dollars; do not know.

24. X Q. You do not remember now what wages you got?

A. Two dollars. First I worked there for fourteen or fifteen shillings; then two dollars.

25. X Q. What wages did the helpers get?

A. From a dollar to nine shillings, part of the time.

26. X Q. How much coal did you use?

A. I do not know.

27. X Q. What was the size of the iron you used?

A. I never kept any account of my iron; if I wanted some iron I notified the road-master and he sent me some iron. I never kept any account about the iron.

28. X Q. How thick was the iron you used?

A. Some half an inch thick; some three-eighths; some five-eighths—well, different sizes.

29. X Q. What work you did was reported and sent in to the company, was it not?

A. Yes, sir.

30. X Q. These reports showed all the work you did, did they not?

A. Yes, sir; I think so.

Witness recalled.

50. Q. When you stated that you got out eighteen or twenty rails a day, what did you mean?

1463 A. You did not ask me how many fires I had. Sometimes I had three fires a short time; then I had two fires, but on one fire I could not mend more than eight or nine, sometimes ten. I think it would average about eight rails.

51. Q. Did you have reference to two fires in answering my former question?

A. Yes, sir.

Cross-examination by Mr. Curtis:

31. X Q. How much do you mend to a rail—how many inches of welding?

A. I put on from two to six inches.

32. X Q. How many men worked in the shop?

A. According to the fires. When there was three there were twelve men; when we had two fires there was eight men; with one fire there was four men.

33. X Q. You had four men at each fire?

A. Some of the time; sometimes I had three men at a fire—sometimes we had only three men.

(Signature waived by consent of counsel.)

JAMES PARK.

1. Q. Please state your name, age, residence, and occupation.

A. James Park; age, 69; residence, La Porte; occupation, blacksmith.

2. Q. Have you ever been employed by the Michigan Southern & Indiana Railroad; if so, when, and in what capacity?

A. I was employed as blacksmith at La Porte. I worked on rails. After that I took Williams' place as foreman in the shop.

3. Q. In what year did you work as foreman at La Porte?

A. From 1862 to 1868, I think.

1464 4. Q. That was when you took Mr. Williams' place as foreman of the shop?

A. Yes, sir.

5. Q. Do you know how long he had been foreman in the shop before you?

A. I think about three years.

6. Q. Is he living or dead?

A. He is dead.

7. Q. How many fires did you keep going at rail-mending?

A. Sometimes five, sometimes six, sometimes seven.

8. Q. What did you do to the rails in mending them?

A. I patched the end, put in centers, welded the ends, straightened them up, put flanges on, and put in dutchmen.

9. Q. Did you ever do anything else at the end than what you have mentioned?

A. I don't remember.

10. Q. Did you cut off any rails?

A. Yes, sir; frequently.

11. Q. What was your method of keeping account of the mending done?

A. We had a report for every day in the week, and sent that into Mr. Paine or Mr. Harris. When I was there it went to Mr. Paine, weekly—so many inches and so many rails.

12. Q. Did you put in any of what you call dutchmen?

A. Yes, sir.

13. Q. When you mended rails in that way how many inches did that make?

A. We always charged for six inches.

14. Q. What was the amount of actual mending?

A. Well, perhaps it might have been from one to three inches.

15. Q. When you cut off rails how much did you count that?

1465 A. Six inches.

16. Q. When you did anything else how much did you count it in patching?

A. We always charged six inches if we did anything.

17. Q. What would the patching be counted, say, if you put on a patch of seven inches?

A. We always put on two inches in the count.

18. Q. How much did you charge for mending in the centres?

A. We always charged two inches more for what there was over six inches.

19. Q. Was that a general practice?

A. That was the general rule.

20. Q. In cutting a rail had you any use for the jaws?

A. No, sir.

21. Q. In mending on the flange did you use the jaws?

A. No, sir.

12. Q. In straightening a rail did you use the jaws?

A. Sometimes they did. When they didn't want to heat a rail, if it was bent a little they put it in the jaws and pulled it to one side a little.

23. Q. State, as near as you can from your recollection, what proportion of rails you mended on the flange.

A. I calculate we mended one sixth.

24. Q. What proportion did you straighten?

A. We did not straighten a great many; might have been one in eight or nine or ten.

25. Q. What proportion did you cut off at the end?

A. About one in six.

26. Q. Do you make this statement from recollection of what you knew at the time?

A. Yes, sir. I kept no record to refer to.

27. Q. State, from your best recollection, how many feet or inches
1466 of actual patching of the surface of the rail would be a fair day's work at the single fire with three men—an average, as you work.

A. About twelve feet—about one hundred and fifty inches, or twelve feet.

28. Q. Was that a fair average day's work?

A. Yes, sir—considered so.

29. Q. Have you worked at it yourself?

A. Yes, sir.

30. Q. And for yourself, with two helpers, what was an average day's work?

A. Just as I state.

Cross-examination by Mr. Curtis:

1. X Q. What wages did you get?

A. Sometimes I got—first I got one dollar fifty cents, then I got two dollars, then two dollars fifty cents, and then two dollars seventy-five cents.

2. X Q. State the times.

A. The time in 1862 was when I had the lowest wages.

3. X Q. When did you get the highest?

A. When I was foreman of the shop. That was from 1866 to 1868.

4. X Q. You had charge of a fire from 1866 to 1868?

A. Yes, sir.

5. X Q. Did you ever keep an account in feet and inches of the welding you did, and return to some officer of the road?

A. Every week?

5. X Q. Always?

A. Always. I sent in two reports—one to Mr. Paine, one to Mr. Harris.

Redirect examination by Mr. Niles:

31. Q. In these reports did you give anything more than the number of rails and the estimated feet and inches done?

1467 A. No.

32. Q. What did you report?

A. I reported as I stated here.

33. Q. That was what?

A. So many rails, so many inches.

(Signature waived by consent of counsel.)

JOHN B. STEWART.

1. Q. Please state your name, age, residence, and occupation.

A. John B. Stewart; age, 42; residence, Coldwater, Mich.; occupation, road-master of the Michigan Southern R'ilroad Company.

2. Q. How long have you been connected with the Michigan Southern and Northern Indiana Railroad; in what place and in what capacity?

A. I have been road-master about nineteen years; I have been foreman of gangs for five or six years before that; then I was a laborer on the road at first.

3. Q. What portion of the road did your district as road-master at different times embrace?

A. The first experience I had as road-master was at Edgerton; from Edgerton to Goshen.

4. Q. In what years; and how many miles in length was your division?
A. I had sixty miles; sixty miles until – I think I commenced the 15th of July, 1858; I think that was it; I was road-master there seven years; then I came on to the old line, from White Pigeon to Adrian.
5. Q. What was the length of that line?
A. Somewhere between sixty-five and seventy miles; then it was changed, after about two years, from Hillsdale to Elkhart.
6. Q. How many miles is that?
A. I believe it is about seventy miles.
1468 7. Q. How long have you been on that division?
A. Nine years the 15th of March next.
8. Q. What have been your duties while occupying that position on the road?
A. I have had charge of the track, the wood and ties, and keeping up the repairs of the road.
9. Q. What have you had to do, during that time, with the damaged rails and their repairs?
A. I had to see that they were taken out of the track when they needed to be changed; we took them out by the section; the rails were piled up in piles along the track, and gathered up and taken into the shop and repaired, and then taken out on the road and put into the track.
10. Q. During all this time what occasion have you had to observe the process of rail-mending in the shops; and what personal attention have you given to the subject?
A. I had an interest to look after it, to see how many rails we were to have each day; how many I could supply to each foreman; to send out the rails every morning, and distribute them along the road to those that needed them the most.
11. Q. State briefly what personal attention you were accustomed to give to the actual operations of rail-mending in the shops.
A. I had to see about them, to see that they were mended in a workmanlike manner.
12. Q. How frequently were you in the habit of visiting the shops for that purpose?
A. I was in the shops nearly every day; the shop was at my headquarters; I would say I was there nearly every day.
13. Q. Did you have occasion to observe, and do you now remember, and will you state as nearly as you can from your recollection, what proportion of the rails were cut off, and not patched?
(Objected to.)
1469 A. The last five or six years of mending I can remember there was a good deal more rails cut off than there was before that, and that we cut quite a good many on account of their being bruised too bad to mend; some were cut because we wanted different lengths; we had seventeen feet, sixteen feet, fourteen feet, and twelve feet rails; they were going out all the time; we had to cut rails, and those we could not mend we would cut for that purpose.
14. Q. Did you, during this time, have the means of knowing what proportion of rails were cut?
A. Yes, I think I ought to.
15. Q. State, according to your best recollection, what was the proportion, averaging the whole time.
A. Well, I think the rails that were cut off would go thirty or thirty-five in a hundred.
16. Q. Do you make that statement from your recollection of the facts?

A. Yes, sir; judging from the rails that we brought in. I know we were always anxious to get out rails of even lengths, and what accumulated would be these uneven lengths.

17. Q. During this time were any rails straightened or mended on the flanges or web—the bottom?

A. Some few were straightened, some were mended in the flange.

18. Q. Is your recollection sufficient to enable you to state; if so, state as nearly as you can, what proportion of the rails were either straightened or mended in the flange?

A. There would not be a great many of them straightened. We used to mend the flange of a good many. I could not hardly get at what proportion; perhaps there would be ten in a hundred flanged.

19. Q. Is that statement from your recollection of the facts?

A. Yes, sir; it is all from recollection.

20. Q. Were the jaws used at all in mending the flange?

1470 A. No. They had a place, a recess or niche in the block the shape of the rail—a place for that purpose.

21. Q. In straightening rails were the jaws used?

A. No, sir; not for straightening.

22. Q. During the time, do you know of what they sometimes called putting in a dutchman?

A. Yes, sir.

23. Q. Describe it.

A. They took a chisel and cut a notch in the head of the rail, and made a kind of wedge and drove into that notch they had cut with a chisel; took a heat and weld it up.

24. Q. How long would be the average mend put onto the rail in such cases?

A. Perhaps the rail would be broken two inches from the end, and might not more than an inch or an inch and a half—just as long as the break was.

25. Q. Can you state from recollection what proportion of rails, pretty nearly what proportion of rails, were treated in that way?

A. It might have been three or four to one hundred—or five.

26. Q. Is that statement from recollection?

A. Yes, sir.

27. Q. During the time of your connection with the road as trackmaster have you been in the habit of visiting the shops at other points on the road than your own division?

A. Yes, sir; I visited the Adrian shops and the La Porte shop before they were started on my division.

28. Q. Did you visit any other shops?

A. I have been in the Wauseon shops, but did not notice the work. When I first started my shop I had a good deal of trouble to get men who understood how to mend rails. I took a man to La Porte to learn, and went with him and tried to learn, so that I could show the men I had.

1471 29 Q. So far as your observation extended, how did the practice in regard to mending rails at your shop compare with the practice on the other divisions?

A. Well, I should say as near alike as could be; we got our lesson from those shops.

30. Q. And you imitated them as near as you could?

A. Yes, sir.

31. Q. Under whose general management was the road during those times; was it under the same general management?

A. It was under Mr. Chas. Paine's and Mr. C. F. Hatch; they were the men I looked to for orders.

32. Q. During this time what was the average number of rails mended per day, at a single fire, by a blacksmith and two helpers, as near as you can state from recollection?

A. Some days we used to get out six rails, some days eight, and some days ten; I don't know but we have got out more; perhaps some days twelve; it depended upon the amount of mending that had to be done. I should say that we got out as many as eight or nine; I think we averaged that many per day.

33. Q. Counting the actual patching of the head of the rail, how many feet or inches of such actual patching did you do; what was the average per day to the single fire?

A. It would be something I would not take very much notice of; I merely noticed the condition of the rails, qualities of the iron; I would see some had patches on eight inches long, some six inches, or a foot—I should think perhaps they might put on ten feet; I could not tell you very correctly.

34. Q. Is that your best recollection from your observation made at the time?

A. Yes, sir; I should say it was.

Cross-examintion by Mr. Turrill:

1. X Q. Is the whole of your testimony based on anything but recollection?

1472 A. No, sir; it is from recollection; I have no figures.

(Signature waived by consent of counsel.)

K. F. BOOTH.

1. Q. Please state your name, age, residence, and occupation.

A. K. F. Booth; residence, Chicago; occupation, civil engineer.

2. Q. You are chief engineer of the Chicago & Alton Railroad Company, are you?

A. Yes, sir.

3. Q. For how long a time have you been in that position?

A. Six years.

4. Q. Did you swear to the answer filed before the master for the company in this case?

By Mr. CURTIS. The answer shows for itself.

By Mr. PAYSON. I know it does.

A. I do not remember now at what time it was made; I have done so many such things that I cannot call it to my mind now, or the particular case.

5. Q. Do you remember making up the account at that time of the number of rails repaired on your road?

A. I think I did make a statement.

6. Q. From what sources was that statement obtained?

A. It was obtained from the monthly reports which I received from different division foremen, and kept on file in my office.

7. Q. In making up the statement what deduction did you make from those reports?

A. I did not make any deduction from the reports made by the road-master.

1473 8. Q. Do you know what the word "repaired," as applied to the rails on your road, included?

A. Well, the reports of repaired rails included everything that went

into the shop to be straightened, or the ends cut off or patched; everything that went into the shop and had anything done to it.

9. Q. They were all included in your reports?

A. Yes, sir.

10. Q. What became of these monthly reports made to you by the road-masters?

A. Everything in my office was burned at the time of the big fire.

11. Q. In 1871?

A. Yes, sir; in October, 1871.

Cross-examination by Mr. Curtis:

1. X Q. When the reports came in, Mr. Booth, you kept them on the book, or had them copied?

A. No, sir; I kept them on file. I never copied or had them copied, except where they were copied into the books for information in making up accounts, and to furnish data for making estimates of the amount of coal and iron.

2. X Q. What did you do with the reports received and filed in your office?

A. We used them in making up the annual reports, and kept them on file in my office.

3. X Q. You made annual reports, in which you used these reports from the road-masters?

A. Used these to get some data out of which to make my reports?

4. X Q. They showed the fuel and iron used in repairing?

A. My reports stated the number of rails and the different kinds of iron.

1474 5. X Q. Specified them?

A. Specified them—the number.

6. X Q. Showed the number of repaired rails?

A. Yes, sir.

7. X Q. That you made every year, I suppose?

A. Once a year; yes, sir.

8. X Q. Did that report specify the expense of repairing rails?

A. I do not think that it did; I have not referred to them for some years; it is some years since we did any repairing; my impression is that we did not state the expense of repairing rails; I would not be positive about that; that is my impression.

9. X Q. How many have you ever made?

A. I made a report every year; my first report as an officer was in 1867, and I have made one every year since.

10. X Q. In making that report you used these road-masters' reports?

A. Yes, sir. I used them in getting at the data. It is the only way I had to get at it.

11. X Q. Your report was a printed annual report, I suppose?

A. Some years it was printed in full, some years not fully.

12. X Q. When not in full it was abstracted?

A. Yes, sir. Some years the president only makes a report in full; but the data in my department were taken from my report, I suppose.

13. X Q. From whom did you receive instructions with reference to making out the statement of rails mended upon this patent block?

A. I do not think I ever received any instructions; it was the custom to make reports. I carried out the custom which was in vogue.

1475 14. X Q. You had no instructions in regard to the actual number embodied in the answer to the road?

A. I think I did have.

15. X Q. From whom?

A. I am not sure; I think from Mr. Church; he was the attorney of the road for some years. My attention was called to the matter; I was requested to furnish Mr. Church with the account.

16. X Q. You have no very distinct recollection about the matter?

A. Only that I made the report that I was called upon to make by Mr. Church.

17. X Q. Such reports as you made were in accordance with his request, I suppose?

A. The report was asked for, and, so far as I was able to, I furnished it, I suppose.

Re-direct examination by Mr. Payson:

12. Q. But this report which you furnished Mr. Church was made, you say, from these monthly reports?

A. Yes, sir; I made out from these monthly reports the number of rails that were mended.

13. Q. And the statement was the same as found in these monthly reports?

A. It was the intention to have it as near as we could make it.

Witness recalled.

By Mr. Payson:

14. Q. How many divisions were there upon the Chicago & Alton Railroad?

A. Up to what time?

15. Q. Up to September, 1870?

A. Well, I think at that time there were seven; we have been in-
1476 creasing from year to year. There were only five in 1868. When we came into possession of the Jacksonville division we made two; I think at that time there were seven.

16. Q. Do you remember when the seventh division was added to the road?

A. The seventh has no blacksmith shop on it. It was added to the road in 1868—the sixth and seventh.

17. Q. Is there any blacksmith-shop on the seventh division?

A. No, sir; never had any.

18. Q. I think you stated that you furnished an estimate of the number of repaired rails to be incorporated into the answer in this case?

A. Yes, sir; I was called upon to give a statement, and I furnished it.

19. Q. In furnishing that statement, what did you include as repaired rails?

A. All the repaired rails that we used.

20. Q. How came you to make that statement in that shape?

A. My attention was not called to the fact that it was wanted in any other shape.

21. Q. In swearing to the answer, stating so many rails repaired, what knowledge had you of what was desired?

(Objected to as incompetent.)

A. I supposed they wanted the total number of repaired rails, the same as I furnished in my annual report.

22. Q. Did you ever make any estimate of the cost of repairing rails on your road on the jaws?

A. Yes, sir, we made one from the reports of the road-masters on the different divisions.

23. Q. Do you remember when that was done?

A. At different times we figured up the cost.

24. Q. Do you remember the result of that?

(Objected to.)

1477 A. At one time I recollect figuring up. I think at that time they cost about a dollar a foot.

25. Q. From what data was that estimate made?

A. From reports of road-masters made to the chief engineer.

26. Q. Are those reports now in existence?

A. No, sir; they were destroyed by the fire.

27. Q. What instructions, if any, did you give to the men in regard to mending rails?

A. My instructions were to curtail the mending as much as possible, as I didn't think it was any advantage to the company to mend.

28. Q. State whether these instructions were carried out.

A. I suppose they were, but to what extent I could not be positive. The instructions were, not to stop, but to gradually decrease.

29. Q. What were your reasons for giving these instructions?

A. I thought the advantage of repairing them was not equal to the cost; and in some cases I considered the rails more dangerous—more liable to break sometimes.

30. Q. Do you know Andrew Reed?

A. Yes, sir.

31. Q. What position has he occupied on your road?

A. As foreman of the blacksmith-shop at Alton, for a number of years.

32. Q. What sort of a blacksmith is he, in your judgment?

A. He has been considered as good a blacksmith as any we had.

Cross-examination by Mr. Curtis:

18. X Q. You have no reports now, Mr. Booth?

A. I have no reports now, as those which were made to me before the fire in 1871 were burned?

1478 19. X Q. Have you tried to get them since the fire?

A. In some divisions they had copies from which they furnished me. I think I have sometimes called for information for some particular purpose. I have never got duplicates in my office since; they were not required for ordinary business, and if anything particular was called for, I asked for it from the road master.

20. X Q. When did you make oath to that answer?

A. I cannot remember the date.

21. X Q. Do you remember the year?

A. I don't know as I could state the year. I remember being asked by Mr. Church to do it. I don't know as I can tell the year it was done, and my attention was never called to the matter; it was not considered of much importance. I remember furnishing what information I could.

22. X Q. What was the cost of mending rails?

A. It varied from time to time; it was not always exactly the same every month. My impression is that at the time we talked of putting in the Bain rollers it was in the neighborhood of a dollar a foot.

23. X Q. When did you put up the Bain roller?

A. I don't know whether I can tell you without referring to data. My impression is that it was in the year 1870 or 1871; I cannot tell; I could tell at my office.

24. X Q. What did you pay your men on that machine?

A. The Bain machine?

25. X Q. Yes.

A. Different prices. We paid the man who had charge of it one hundred and twenty-five dollars a month. I don't know as I could tell the prices of all the men; there was several different grades.

26. X Q. While you mended these rails at all, what did you pay your blacksmiths?

A. In the shops that repaired them?

27. X Q. Yes.

1479 A. They were not all paid the same. I think some got three dollars and fifty cents a day; some ninety dollars a month.

28. X Q. How many men did you use to a fire?

A. Well, I never attended to the details of the work; was not familiar with the management of the details. The road-masters had immediate charge of each shop on their own division, though they didn't spend their time in the blacksmith-shop.

29. X Q. How many fires did you have occupied in mending rails in the year 1865?

A. That was before I was connected with the road.

39. X Q. How many fires did you have occupied in mending rails in 1868?

A. In 1868 I think we had five.

31. X Q. Where were they?

A. One at Summit, one at Chenoa, one at Bloomington, one at Springfield, one at Alton.

32. X Q. You think you had only five fires in 1868?

A. There was a fire started at Jacksonville, but my impression is we didn't repair any there in 1868, though we may have done in the last part of the year.

33. X Q. Did you have any fire at Springfield?

A. Yes, sir; I stated Springfield had one shop.

34. X Q. How many fires did you have in each shop?

A. I think there was a fire for repairing rails—perhaps three altogether; but they usually had a fire for repairing rails separate. Three fires sometimes in the shop, sometimes two, sometimes one.

35. X Q. How many fires did you have at Bloomington?

A. I don't know whether there was more than one. There might have been two. I don't think there was more than one.

36. X Q. How many fires did you have at Jacksonville?

A. One, and that only a part of the time. We had other work to do. The fires in all the blacksmith-shops kept decreasing.

1480 37. X Q. You don't think it is an economical thing to repair rails?

A. No, sir; I think the general superintendent now thinks so. He gave orders not to have any repaired.

38. X Q. What is the price of iron?

A. Iron rails at this time—I am not able to say. I think eighty-five dollars a ton.

39. X Q. What was it in 1863?

A. I could not tell.

40. X Q. What was it in 1867 and 1868?

A. I don't remember. I don't think I can tell.

41. X Q. Can you tell us whether it was higher or lower than it is now?

A. In 1868?

42. X Q. Yes, sir.

A. I think a little higher, perhaps; not much.

43. X Q. Do you now reroll your rails?

A. We were rerolling them. We are using steel rails. We have been getting rerolled rails. Rerolled rails are just as good as new rails—so considered.

44. X Q. When did you begin to reroll rails?

A. They began it before I came on to the road.

45. X Q. What do you know of the first rerolling being done, and where were the rails delivered?

A. For the Chicago and Alton road?

46. X Q. Yes.

A. The first I knew about it was in 1866. That was the first year I was connected with the road. I saw the rails rerolled. They were good rails. We delivered them at the Bridgeport Rolling-Mills, the rolling-mills of the Union Rolling-Mills, Mr. Chisholm, manager.

47. X Q. Did you ever keep any record, Mr. Booth, from actual measurement, by which you could determine the number of rails mended, and the number of inches mended to the rail?

1481 A. I never measured any of the rails myself.

48. X Q. Did you ever measure a day's work done in these shops?

A. I never spent a whole day in a blacksmith shop; have staid in them perhaps a half an hour at a time.

49. X Q. Did you ever see a rail cut off at one end and mended at the other?

A. I have seen rails cut off and seen them mended. I should think they cut off one end and mended one end. I have seen them cut off at one end and mended at the other end.

50. X Q. Did you ever see a rail mended in the middle?

A. Yes, sir.

51. X Q. You stopped mending rails when you began to buy steel rails?

A. No, sir, we didn't do that; we commenced seven or eight years ago to lay steel.

52. X Q. As you laid down steel you decreased the amount of mending?

A. We decreased it before we laid any steel rails; it has been only about three years we have laid steel rails to any extent.

53. X Q. Can you mend steel rails?

A. I don't think you can; never have seen it done; never have seen any want of it.

54. X Q. Taking the time when you began to lay your track with steel rails, did you or not decrease the amount of mending from that time?

A. No, sir; I don't think the decrease commenced till after that time; they had commenced laying steel rails when I came on to the road. I think the mending was increasing when I came on the road.

55. X Q. Did you make any crossings?

A. Yes, sir; we made crossings at the shops.

56. X Q. How were they made?

1482 A. I am not familiar with the details of it; never saw one made; never saw them go through the process.

57. X Q. Did you steel-point any frogs?

A. Yes, sir; I think there was some frogs, iron-rail frogs made at the shop, that were steel-pointed. I don't think there were many of them. I cannot tell very accurately about that.

58. X Q. Do you know how they were made?

A. I cannot give the details of the process. I never watched it; have never been familiar with it.

59. X Q. Do you know how many were made?

A. No, sir.

60. X Q. Do you know where they were made?

A. I know there were frogs made at the different shops. I think it is likely they were made at all the shops; the road-masters had them made; I cannot tell whether they all did or not.

61. X Q. The reports that came from all these shops passed through your hands, did they not?

A. Yes, sir; came to my office, I suppose; all of the road-masters furnished me reports.

62. X Q. You made your own reports from the reports that were furnished to you by the road-masters?

A. Yes, sir.

63. X Q. Did they furnish any report of the frogs that they made?

A. That they mended?

64. X Q. Yes, sir; that they pointed?

A. I think they did.

65. X Q. Did you return a report showing the facts with reference to the work done on frogs?

A. A report to whom do you mean?

66. X Q. To the superintendent.

A. I don't think my annual report stated the number of frogs.

1483 67. X Q. The reports that came into your hands showed the number?

A. I think they did; they might not have done so on all occasions, but I think they did generally.

68. X Q. How many fires do you think there were in Springfield?

A. It is my impression that we had arrangements for three fires, if they chose to run them. They built new shops. I suppose the rail-repairing was part of it done in one shop and part in the other.

69. X Q. How many fires did you have at Bloomington?

A. I guess three fires. I don't think more than one was used for repairing rails, but for other work.

70. X Q. Do you know how many fires there were at the Summit?

A. I cannot state positively; I have been at the shop several times; my impression is there were three.

71. X Q. Do you remember how many fires there were at Jacksonville?

A. Not more than two at any rate; I don't know but there was two; there was but one used in repairing rails.

72. X Q. Do you know how many fires there were at Chenoa?

A. No, sir; I think there was two.

Redirect examination by Mr. Payson:

33. Q. Did you mend any rails on the seventh, or eighth, or ninth divisions?

A. No, sir.

34. Q. These rerolled rails were rerolled at the regular rolling-mills, and not mended in any way on the Bain rollers?

A. No, sir; the Bain rollers did not reroll—they repaired.

35. Q. Did you point any frogs?

1484 A. Yes, sir; but we bought more than we made at the shops.

Recross-examination by Mr. Curtis:

Q. I don't think the Bain machine rerolled rails?

A. No, sir, it did not; it is only another way of repairing—an improved swage block.

H. J. CORBUS.

1. Q. Please state your name, age, residence, and occupation.

A. H. J. Corbus; age, 45; residence, Adrian; occupation, track-master.

2. Q. What position have you occupied on the Michigan Southern & Northern Indiana Railroad and the Lake Shore & Michigan Southern Railroad, and for what time?

A. I have occupied the position of track-master since April 1st, 1857.

3. Q. What is your division of the road; what is its length?

A. My division, in 1857, included the road from Three Rivers to Adrian, one hundred and ten miles.

4. Q. What are, and have, during that time, been your duties in that position? State briefly.

A. My duties were looking after the repairs of the track.

5. Q. What, during that time, have been your duties in relation to damaged and repaired rails on your division?

A. Well, they were loaded up by the construction-train and taken to the shop and there repaired; they would be piled up in a pile; I would take the train there to the shop and load up the rails, loading the different lengths and different kinds of repairing separately.

6. Q. Under whose direction were they taken out of the track for removal to the shops?

A. My own.

1485 7. Q. Under whose direction were they returned by the construction-train?

A. My own.

8. Q. What knowledge and supervision, if any, had you of the running of the construction-train and of the repairing of rails?

A. This iron, when it was repaired and loaded up again, was loaded separately, in separate piles of different lengths; we loaded it on different cars. I will say, for instance, that this iron was to be put in a particular place, and the iron was selected for that point, different lengths, and different kinds of iron; it was some time before they left the shop, before they were all loaded and taken away.

9. Q. By whom was this done?

A. By me, as a general thing.

10. Q. What was the object of your examining the rails before being loaded?

A. There are different lots of iron—some fifteen, some eighteen, some twenty-one feet long, this iron that was cut off—and this was put by itself. The iron repaired goes by itself, as a general thing.

11. Q. What means had you of becoming acquainted with the process of rail-mending in the shops under your division?

A. I frequently visited the shops and saw them repairing.

12. Q. How frequently were you accustomed to pass over the road on your division, and with what purpose?

A. Well, from three to four times a week, as a general thing; sometimes oftener; sometimes every day over portions of the track; sometimes over the whole length, as the case required.

13. Q. Did you have means of knowing at the time what proportion of damaged rails were cut off at the end, or straightened, or mended in the flange, compared with the whole number of damaged rails repaired?

1486 A. Well, yes; I noticed the iron before it left the shop, and I knew about what kind or what class of iron goes to the different points; the different lengths, and the way it is repaired, and so forth.

14. Q. Can you now, from your recollection, state proximately what proportion of rails repaired were cut off, or straightened, or mended in the flange, and not patched at all? And, if you can, state what the proportion was according to your best recollection.

(The complainant objects to any proximate statement as a discharge of the amount charged upon the account rendered before the master, as incompetent and inadmissable.)

A. Well, from my best recollection, I should say one-third of them.

15. Q. Is that statement from recollection, or otherwise?

A. It is from recollection.

16. Q. What was your purpose in visiting the shops so frequently, as you say you did?

A. Well, I was looking after the iron to see about how fast they were getting it out. Each fire is calculated to do so much per day; if they cut off rails they got out more than if they repaired both ends. I visited them to see how many bars were got out, and to examine them.

17. Q. Who selected the rails for distribution at different points on the track, and controlled the distribution of them?

A. I did.

Cross-examination by Mr. Curtis:

1. X Q. Did you keep an accurate account, Mr. Corbus, showing the number of rails cut off, or straightened, or both, as distinguished from the number patched?

A. There was a report made to me every month, giving those that were cut off, and those that were pieced or straightened; and each man was credited with the number of rails that he got out of his shop.

1487 2. X Q. That report showed whether they were cut off, or pieced, or patched?

A. Yes, sir; it was returned.

3. X Q. You returned it?

A. I returned it all the time. I kept accurate account of the rails.

4. X Q. They were kept separately?

A. Yes, sir.

5. X Q. They were sent every week?

A. Yes, sir. I sent the whole number of rails; we will say three hundred and fifty or four hundred rails, repaired at the shop.

6. X Q. Did you send every week, all the time you were there?

A. No, sir; I took some memoranda of them.

7. X Q. Where did you keep it?

A. In my pocket; that is, I looked the iron over and put down the length and kind of repair.

8. X Q. You kept the reports made to you on your book?

A. Yes, sir.

9. X Q. What did the reports that came to you from the shop show?

A. They showed the kind of iron.

10. X Q. And these reports you gave were from your book?

A. I kept them in the book.

11. X Q. What did you do with that book?

A. I used the book to keep the account of the iron. I do not know where it is.

12. X Q. Did you keep the book after 1857?

A. I was looking for it the other day, and could not find it.

13. X Q. Won't you state, more definitely and accurately, what was included in the reports made to you by the different foremen every month?

1488 A. Yes, sir.

14. X Q. Did those reports specify the good rails and the patched rails?

A. Yes, sir.

15. X Q. And that statement went into the books?

A. Well, I will say I made the report to the superintendent; I actually could not say whether it went into the books.

16. X Q. Did you have a memorandum of the amount of cut-off rails?

A. I made a memorandum of it each month.

17. X Q. What did you do with the papers from which you made that memorandum?

A. I do not know.

18. X Q. You sent off one every month, didn't you?

A. Yes, sir; it was to give credit to each foreman for how much they had done—for the amount done more than the other shops. It was merely done to see how much work was got out.

19. X Q. Have you got any of these monthly papers which came into your hands from the foreman?

A. No, sir.

20. X Q. When did you last see any of them?

A. I have not seen them in seven or eight years.

21. X Q. Have you kept them?

A. No, sir.

22. X Q. What book was it you spoke of trying to find, but could not find?

A. The book in which I made this memorandum about the iron. I could not tell, it may have been burned up.

23. X Q. Do you generally burn up these papers?

A. The books do you mean—the monthly reports?

24. X Q. Yes, sir.

A. They were sent in to the superintendent.

25. X Q. With all the items upon them?

1489 A. No, sir; the superintendent gets a report of so many bars monthly. He has an account of the number of rails, forty or fifty, or whatever the number is. I put down that, and it goes in to the superintendent. It is drawn out on a piece of paper, and the foreman keeps a regular account of it, and I make a report of these pieces of paper; and that is all the superintendent gets.

26. X Q. You got from each foreman a report each month of how many rails were repaired and of what had been done to those rails, didn't you?

A. Yes, sir.

27. X Q. Were all those monthly reports that you gave turned over to the superintendent?

A. I sent them.

28. X Q. You did not alter them; sent them just as they came to you?

A. Yes, sir. If a rail was heated to be straightened, it was reported as a mended rail and put in the pile by the foreman. He estimated the amount of mending on the rail.

29. X Q. Suppose you only cut off the bars, how many would they turn off in a day; how many bars to the fire?

A. They might cut off fifteen or twenty.

30. X Q. Not more than that?

A. Well, they might more. It was not all done at one fire. A part of them would be repairing and the others cutting off.

31. X Q. You reported them with the repaired rails if they were only cut off when you did not repair them, I suppose?

A. Yes, sir.

32. X Q. Such items as you had given to you in regard to the work done to the rails came in on these monthly reports?

A. No, sir; the items that I took was just from my own examination of them; the amount of iron I took from the foreman. I made a memorandum so as to know where to put these rails. If the bar was to go to section ten or eleven I had to find out about it.

1490 33. X Q. Did they make a return to you every day?

A. I got my returns in pencil, and put them on my book.

34. X Q. What was the length of your division?

A. One hundred and ten miles.

35. X Q. If you could not get your reports in person, did you have them sent to you?

A. The foreman of the shop where I lived. I always made it a point to be there.

36. X Q. Did not you stay away sometimes?

A. If I stayed away I got the report when I came back.

37. X Q. From the other shops they were sent to you?

A. They were sent to me or I took them from the foreman.

38. X Q. You have not got any of these reports now?

A. These memoranda were all destroyed. Perhaps I took them on a piece of paper; a piece of telegraph paper; took down the number of rails of such and such length—twelve feet long or fifteen feet long—and I would have these bars sent to Three Rivers or wherever they were to go.

39. X Q. Did you send a report to the superintendent of the length of the rails?

A. Not often.

40. X Q. You did not?

A. No, sir.

41. X Q. Did you ever jump rails, as they call it—welding two pieces together?

A. Yes, sir.

42. X Q. You sometimes mended one end and cut off the other, where the rail was good and sound except one end?

A. I think that has been done.

43. X Q. Sometimes you mended rails in the middle?

A. Yes, sir; mended in the middle—not when we first commenced, in 1857; it was done after we had got in furnaces.

34. X Q. Your knowledge of the matter ceased in 1857. To what period did you continue to work?

1491 A. Until 1864, when we got these blocks we got furnaces.

45. X Q. After you got the furnaces you used some kind of a jaw-block, did you not?

A. Yes, sir.

46. X Q. How many rails do you think they usually got out at one fire, on an average, per day?

A. I think they would average about eight or ten—I think eight; if they had welded both ends it would be a good day's work to get out eight. If they welded at one end they might perhaps get out ten—that is, with the bellows.

47. X Q. Where was the shop located?

A. At Cold Water.

48. X Q. Was there any other point where there were mending-shops on your division?

A. At Hudson and Adrian; at Adrian I had no immediate supervision—that is, was there about once a week.

49. X Q. Did these shops make a return to you in the same manner that the others did?

A. I did get their return. I did from Hudson.

50. X Q. How was it from Cold Water?

A. The same that I got from the other men. When I got a load at Hudson I made a memorandum. There was only one fire, and the iron was taken out of the shop and laid until there was a load of it; then I loaded up and made a memorandum of it.

51. X Q. Do you think you have sent a report showing specifically the number of rails cut off, or mended otherwise, from those which were patched eight or nine years ago?

A. No, sir.

Redirect examination by Mr. Niles:

18. Q. How do you say that these memoranda, which were kept by you, were made; that is, were they in a book or on paper merely?

1492 A. Sometimes I would get onto the pile, count the rails, and make my memorandum and put down the length of the pieces; and sometimes I would take the report from the blacksmith.

19. Q. What kind of book did you use?

A. A small book; one of those little memorandum-books. I kept it in my pocket.

20. Q. What was the use and purpose in keeping this memorandum?

A. I would say it was to find out where to put the loaded rails. If I had rails fifteen feet long, I would put them in one place and another length of rails in another place.

21. Q. After these rails had been reloaded were these memoranda of any use to you?

A. No, sir.

22. Q. Was there any object in preserving them after that?

A. No, sir; I merely took that memorandum for my own benefit, to see how many bars were to be distributed at the different points.

23. Q. Were any such details as were mentioned in your memorandum reported, so far as your knowledge extends, to the general office?

A. No, sir.

24. Q. You speak of jaws being used; will you look upon this model, marked "Cleveland vise or Whitcomb machine," bottom out, and state whether it resembles the block you used at Cold Water?

A. Well, it resembles it. I could not give you a full description of it at all.

Recross-examination by Mr. Curtis:

52. X Q. What were the names of the foremen who worked in each of those shops?

1493 A. There was one by the name of David Pulver, the other was Michael Wagner.

53. X Q. Where did each of them work?

A. Pulver worked at Cold Water, Wagner at Hudson.

54. X Q. Who was foreman at Adrian?

A. I think Brennan was at that time.

55. X Q. How many fires did you have at each of these points?

A. Four fires at Cold Water, one at Hudson, and, as a general thing, two welding iron at Adrian.

56. X Q. There were six fires. Now, where are the other foremen of the remaining three fires? You have named Pulver, Wagner, and Brennan as foreman of three fires.

A. Now you want the foremen of the other fires?

57. X Q. Yes, sir.

A. Well, one was named Alexander Yaeger, one George Dickenson; the other man I cannot remember the name of.

58 X Q. Where is Yaeger at present?

A. I do not know.

59. X Q. Where is Dickenson?

A. At Cold Water, I think.

60. X Q. Where is Wagner?

A. I do not know, but he has left the road. I do not know where he is.

61. X Q. You are still employed on the road?

A. Yes, sir.

Witness recalled:

25. Q. State whether you are acquainted with George Wagner, the man who has just been examined in this case?

A. Yes, sir; I am acquainted with him.

26. Q. Where have you known him?

A. He was foreman at the Hudson T-rail shop for a long time—eight or nine years.

1494 27. Q. What connection had you with that shop during that time or any part of it?

A. I was road-master of that division.

28. Q. How frequently did you have occasion yourself to visit the shop?

A. Well, about three times a week I would call there sometimes. Sometimes not quite so often; perhaps twice a week.

29. Q. What kind of blocks or machines were in use for mending rails in that shop?

A. They had one that we called the Beebe block, and they had two common swage-blocks—flat blocks.

30. Q. On which of these did Wagner work?

A. Wagner worked on one of these common swage-blocks all the time.

31. Q. Was there a set of hands during the time working upon the jaws in that shop?

A. Yes, sir.

32. Q. How many worked at each anvil or machine?

A. It generally took three men to work a fire.

33. Q. Did you notice, and do you now remember, how the work done by Wagner on the smooth anvil compared with that done by the other men on the jaws? And, if so, state as to the quantity and quality.

A. My observation in that matter would be that the rails were put together, and I could see no difference in that mended on the swage-block or that on the jaws. I did not examine very closely in regard to that matter.

34. Q. Did you take sufficient notice to be able to give an opinion, founded upon your recollection of the facts, as to the amount of work—of the number of rails mended by Wagner compared with the number mended on the jaws?

A. Well, I was told by Wagner that he got out from one to two more rails than they did with the jaws. I took it from that that he would

get out from nine to ten or eleven of them—that is, one or two per day more than they did.

1495 35. Q. During the time you were road-master on the Michigan Southern & Northern Indiana Railroad, before the consolidation, did you have means of knowing what proportion of rails were cut, or straightened, or mended in the flange, as compared with the whole number repaired in the shops in any way?

A. I think I did; every year I took the amount of iron that was got out—that was cut and repaired.

Cross-examination by Mr. Curtis:

62. X. Q. How many rails did Wagner tell you he used to get out in a day?

A. He got out nine, or ten, or eleven; it would depend on the condition of the iron somewhat as to what he got out; he would get out ten or fifteen, perhaps, while the others were getting out but eight or nine.

63. X. Q. You recollect that that is what he told you, do you?

A. Yes, sir.

(Signature waived by consent of counsel.)

OSCAR A. SIMMONS.

1. Q. Please state your name, age, residence, and occupation.

A. Oscar A. Simmons.

2. Q. You have been examined before in this case?

A. I think so.

3. Q. Are you still connected with the Pittsburg, Fort Wayne & Chicago Railway; and, if so, in what capacity?

A. I am road-master on the Fort Wayne Road.

4. Q. You have been in that position since you were last examined, have you?

A. Yes, sir.

1496 5. Q. What is comprised in your division?

A. It is the road from Crestline, Ohio, to Chicago.

6. Q. State, if you please, whether you made reports of repairing rails on your division, and how those reports are made, and what they contain?

A. We didn't make reports of the quantity of iron; we made reports of the money expended in "iron rails."

7. Q. How often?

A. That is done on our expense-bills—the "distribution of accounts," that is returned by me to the division superintendent once a month.

8. Q. In your reports was there put (so far as you know) an item that would show that?

A. The expense of "iron rails" and "iron" used in repairing, the handling of repaired rails, were all put in the "maintenance-of-way" account.

9. Q. You reported that all in the "maintenance-of-way" account?

A. Everything that pertains to that, except new work, is charged to the "maintenance-of-way" account.

10. Q. In taking up one of these reports, is there anything to designate the different ways of repairing rails?

A. Nothing.

11. Q. Can you tell which are "cut off" and which are "patched" from these reports?

A. There has never any report passed through my hands that I could tell by.

12. Q. You stated in your former examination that you had seen the Cawood machine at work; what would you say was the average length of patch, so far as you can tell, on that road by that machine?

A. Not far from six inches.

13. Q. Not far from six inches?

A. It would not be far from the average.

1497 14. Q. Have you any data by which you can tell the difference in the cost of repairing on that machine and on the common anvil, for labor, fuel, etc.?

A. No, sir.

15. Q. Was there any data by which you could tell that?

A. No, sir.

16. Q. You stated that you are road-master from Crestline to Chicago; how many divisions, in regard to road-masters, are there on the road?

A. I am road-master from Crestline to Chicago, and there is one road-master from Pittsburgh to Crestline.

Cross-examination by Mr. Curtis:

1. X Q. Do you know how many rails it takes to a ton?

A. I know the weight of iron by the yard.

2. X Q. How much does what is called chair-iron weigh?

A. Fifty-six pounds to the yard; we are using now the fish-plate rail, which runs sixty pounds to the yard.

3. X Q. You saw mending on this jaw-block at Lima, Ohio, did you not?

A. Yes, sir.

(Signature waived by consent of counsel.)

JAMES C. McMULLEN.

1. Q. Please state your name, age, residence, and occupation.

A. James C. McMullen; age, 37; residence, Chicago; occupation, railroad superintendent.

2. Q. Of what road?

A. The Chicago & Alton Railroad.

3. Q. For how long have you been superintendent of that road?

A. I have been general superintendent of that road for something over five years.

1498 4. Q. What are your duties as such superintendent?

A. I have charge of the details of the road's operations—its business of all kinds.

5. Q. What knowledge have you of the business of mending rails?

A. I have a knowledge which is derived from personal inspection of the work and reports from and conversations with the men engaged in the business, etc.

6. Q. What reports are those you speak of?

A. We required, during the time we were mending rails—required the men in charge of the shops to report what work was done, the amount of material used, the wages paid, and several other details, which were examined by me monthly.

7. Q. Are any of those reports, made prior to October, 1870, now in your possession?

A. They are none of them in my possession; they were all burnt in the fire of October, 1871.

8. Q. Have you any means of knowledge as to the number of rails repaired prior to that time?

A. I have taken from the reports—it is my impression that I gave the number of rails, the statement, in our answer to this bill. I gave an estimate from the reports made a few days ago, which is substantially the same figures as given by Mr. Blackstone.

9. Q. For what purpose was that statement made?

A. I was requested by Mr. Church to furnish it.

10. Q. For what purpose?

A. To make answer to this bill; a statement of the number of rails mended upon the block in use upon which rails were repaired.

11. Q. Will you please state what that was more particularly?

A. It was a statement against the Chicago & Alton Railroad Company.

1499 12. Q. From the reports of men using the machines in mending rails?

A. Yes, sir.

13. Q. In furnishing that statement what did you include?

A. I included everything generally embraced in mending rails—patching, straightening, or any other thing done to the rail going into the shop that was called repairing.

14. Q. What deduction did you make on account of anything not done on this machine?

A. I didn't make any.

15. Q. Why not?

A. Because I supposed that was what was wanted. If I had known I would have given a different report.

16. Q. What proportion of these rails that were reported as repaired were actually patched upon the top?

A. I could give simply my opinion, but I should suppose about one-half or two-thirds; I think two-thirds would be a large estimate.

17. Q. What was done to the rest of them?

A. In many cases they required straightening, others cutting off slivers, others cutting off the end and putting in a piece in the ends.

18. Q. All these were included in the report which you received of repaired rails, and so reported by you to Mr. Church?

A. Yes, sir.

19. Q. Do you know what was the average amount of welding upon a single rail, taking them altogether?

A. That question I would have to reply to by giving my opinion. My estimate would be about six or eight inches.

20. Q. On what do you base that estimate?

A. From conversations with the men in the shop to ascertain what amount they were averaging, and seeing the rails in the track, and having frequent reports. I think six or eight inches.

1500 21. Q. When did you have any conversations with the men upon that subject?

A. When the work was being done.

22. Q. How often were you in the shop?

A. At least once a month. I always went to the shop as often as possible; it was a place where the money was being drained out very fast, and needed watching.

23. Q. How often did you go over the line?

A. Every two weeks, over the entire line.

24. Q. What attention did you give to this matter?

A. I gave particular attention to the track; it was watched more particularly than anything; I gave the same attention to the work of repairing rails as to anything else connected with the track.

25. Q. Can you state how many rails were mended in a day at one fire?

A. I could not state that; I have no data at all to base that on.

26. Q. Have you any knowledge of the cost of patching rails?

A. I have none sufficiently definite to give an answer; my impression is that we made an estimate that would cover the entire cost; I don't think I have the details; we made the estimate just before we purchased the Bain rollers.

27. Q. Are you able to state what that estimate was?

A. Yes, sir; one dollar and five cents.

28. Q. Who made that estimate?

A. It was made by myself and the engineer; we figured on the reports from the road-masters along the line of the road, to see how much we would save by employing the Bain rollers.

29. Q. When was that made?

A. I think it was in 1868, or the last of 1867.

30. Q. What character of reports were made from the several divisions as to rail-patching?

1501 A. There was a detailed report made every month showing the length of the patching, the amount of iron, and amount of coal and labor—detailing the whole thing, to the number of rails.

31. Q. Were these reports made on printed blanks?

A. Yes, sir.

32. Q. Were reports made of the same character from all the divisions?

A. Yes, sir.

33. Q. How do you find that they compared?

A. They were very near the same as to the quantity of mending.

34. Q. Do you know what your iron weighed for patching, by the foot?

A. No, sir; I do not.

35. Q. Did you do as much or more patching preceding the year spoken of—1870—as you had been doing previous years?

A. We had been doing considerably less.

36. Q. Can you state what proportion?

A. It would simply be an estimate; it is my impression that we didn't do any repairing at all after July, 1870; I don't think we did for six months before.

37. Q. What was the reason?

A. We were expecting to have Bain's roller in operation, which promised to do the work for two-thirds of what it cost in the other way. It was to be done in July, but we didn't get it ready until October; but we shut down in July.

38. Q. Had you no other reason for stopping the mending of rails?

A. Yes, sir; we had another reason. The rails got so we could not keep trains on the track, and we were fitting up the Bain roller.

39. Q. What had getting trains off the track to do with mending rails?

1502 A. We had rails breaking constantly.

40. Q. Where did the rails break?

A. Immediately at the point where they were patched.

41. Q. What opinion did you form as to the security of mended rails?

A. That it was decidedly unsafe to patch rails, and we did so for convenience; and we didn't put them in the main track at all.

Cross-examination by Mr. Curtis:

1. X Q. Did the reports made from the different shops show the number of inches which you welded?

A. Yes; I think they did.

2. X Q. When you cut out the centers you put the ends together and welded them, did you not?

A. No, sir.

3. X Q. What did you do with them?

A. They were put together by fish-plates, and used then for repairing track.

4. X Q. You have had a written paper before you, to which you have referred; when, where, and by whom was it made?

A. This written paper is a statement of the number of tons and number of rails, made up from our reports—of the number of tons of repaired rails and the number of rails.

5. X Q. When was it made, where was it made, and by whom?

A. Made this last week, by myself.

6. X Q. Is that in your handwriting?

A. No, sir; it was copied by my clerk.

7. X Q. Did you make the original, and he copied it?

A. Yes, sir.

8. X Q. Where did you make the original?

1503 A. It is customary for me to write everything in pencil and have it copied.

9. X Q. The contents of this paper was taken from the reports in the office of the company, was it not?

A. Yes, sir; the number of rails was there. I got it up a number of years ago for Mr. Church. I was very particular about getting it as nearly correct as possible. The number of rails and number of tons I took from the annual reports of the company until that year. With the exception of 1870, they show the number of tons of repaired rails used.

JAMES C. McMULLEN.

PATRICK LEE.

1. Q. Please state your name, age, residence, and occupation.

A. Patrick Lee; age, 45; residence, Chicago; occupation, road-master of the Chicago & Alton Railroad.

2. Q. How long have you been road-master?

A. Four years last September.

3. Q. What have been your duties as such road-master?

A. I have charge of the track, charge of the blacksmith-shop and carpenter-work.

4. Q. What had you to do with the mending of rails?

A. I used to send two or three car-loads of rails in at a time to get mended, during the first four months I was on the road.

5. Q. How often were you in the shop where the mending was being done?

A. Sometimes I would be in there for three or four days, one after another—may be two hours at a time; then, perhaps, once or twice a week.

6. Q. Whose business was it to oversee the work—to see that it was done?

A. It was mine.

1504 7. Q. What attention have you been in the habit of giving to see how the work was done, or what amount was done?

A. I always knew what was the number of rails; I always kept a memorandum of the number. They used to mend from seven to fifteen rails per day.

8. Q. What reports were made in the shop, and by whom?
A. By the foreman of the shop—by Rooney.
9. Q. What did you do with these reports?
A. Who sent them to me?
10. Q. What did you do with them?
A. I was allowed a clerk, and took them to the clerk in the general office and left them with him.
11. Q. In the general office?
A. Yes, sir.
12. Q. What examination did you make of these reports?
A. I examined them to see if they were all right, and then sent them in.
13. Q. Who signed them?
A. I signed them—my name and Rooney's name.
14. Q. Why did you sign them?
A. As being correct.
15. Q. What proportion of these rails were not patched at all?
A. I think about two-thirds of what I sent in was cut off and holes punched in them.
16. Q. Was that done on the jaws or on the smooth block, or on the top of the jaws?
A. I could not state that certainly.
17. Q. How were you employed before you were road-master?
A. I was construction-foreman—putting in side tracks and repairing tracks.
18. Q. On what road?
1505 A. The Rock Island and St. Louis. I am ten years on the Alton road.
19. Q. Where were the repaired rails mostly laid?
A. Mostly in the main track, except where they were cut off for the side track; we used to mend hardly any for the side tracks; we cut them off.
20. Q. What, in your judgment, would be a fair day's work in solid patching at one fire with three men?
A. I have inquired at several times from blacksmiths, some very good ones——
(Objected to as hearsay.)
A. Most of them say they could mend one hundred to one hundred and forty inches; we considered that a very good day's work if it was well done.
21. Q. What would be your judgment as to a fair day's work from what you yourself have seen?
A. I never mended any rails. I considered one hundred and twenty inches a fair day's work.
22. Q. State how much was really done in your shop in one day, so far as you know.
A. The most I ever knew to be done in it since I had charge of it was seventeen rails; there was some of them mended and the balance cut off.
23. Q. In these reports you have spoken of what was included under the head of repaired rails?
A. Everything done to the rails that was done in the shop.
24. Q. You included, then, cut-off rails?
A. We included them in the report.

Cross-examination by Mr. Curtis:

1. X Q. Did you ever measure a day's work yourself in your life?
A. Yes, sir.

1506 2. X Q. When, where, and under what circumstances, and what did you do with the record of it?

A. I could not tell what I done with the record. I measured them at the Summit. I did not take any record of it, only just measured to satisfy myself; that was all.

3. X Q. When?

A. In the first four months that I was road-master. I could not tell exactly the time.

4. X Q. Did you measure the number of feet and inches welded?

A. Yes, sir; that was the day they mended seventeen rails.

5. X Q. What was the number of inches mended?

A. I could not give it exactly; somewhere in the neighborhood of seventy or eighty inches.

6. X Q. Seven rails, and seventy or eighty inches were welded?

A. Yes, sir; it might be more than that; I would not say to the inch, because I kept no record of it.

7. X Q. How came you to make that measurement?

A. I wanted to satisfy myself what they would do in the shop.

8. X Q. How many of the rails were patched?

A. I think seven, might be eight, from what I can think now.

9. X Q. Were they patched on one end or both ends?

A. Some of them were patched on one end, some of them on both ends, and, I think, some in the center.

10. X Q. Some at both ends, some in the center, and some at one end?

A. Yes, sir.

11. X Q. On the seven or eight rails you put only seventy or eighty inches on the end, on the center, and all?

A. I think so.

1507 12. X Q. Do you not know?

A. I measured, but I did not keep any account, and I never thought of its coming up now, because we stopped mending rails right away after that.

13. X Q. Right after you did that?

A. Yes, sir; it was after I did that.

14. X Q. When you had these accounts or reports you had a copy made, and sent one copy in to the chief engineer?

A. I took the reports in to the clerk that did my work in the office.

15. X Q. Where was that clerk?

A. In the office.

16. X Q. In Chicago?

A. Yes, sir.

17. X Q. What did you do with the copy of it?

A. He kept it in his desk.

18. X Q. Were you ever called on to make any statement to him as to what rails you mended?

A. I had to make a statement every year; he would do that.

19. X Q. Did you report in writing the number of inches; did your account show anything about it?

A. They went to Mr. Booth; I do not remember.

20. X Q. You do not remember whether your report had any means of telling anything about what you did?

A. No, sir. Would say I had no thought about the number of inches mended until this thing came up.

21. X Q. What thing do you mean?

A. This case. I never thought I would be called upon for anything in regard to it.

22. X Q. You knew the road was sued?
A. I did, sir; that is just what brought it into my head about it.
(Signature waived by consent of counsel.)

1508 JOHN STEPHENSON.

1. Q. Please state your name, age, residence, and occupation?
A. John Stephenson; age, 43; residence, Hudson, Michigan; occupation, blacksmith; work at Adrian.
2. Q. How long have you been employed, if ever, by the Michigan Southern & Northern Indiana Railroad Company, and where?
A. I could not positively say; I should say, probably, six or seven years I have been working for that company—probably not quite so much; I could not say.
3. Q. And where?
A. I worked in La Porte for the company, and I worked in Adrian for the company; also in Elkhart for the company.
4. Q. In what years did you work for them at Elkhart?
A. I think it was 1861 or 1862, as near as I can recollect.
5. Q. And how long at La Porte?
A. One year at La Porte.
6. Q. How long did your work at Adrian?
A. Well, really, I could not say in fact.
7. Q. State the time, as nearly as you can, according to you best recollection.
A. Along in 1853 or 1854; it was before I worked in La Porte that I was there.
8. Q. What did you do for the company at La Porte?
A. I repaired rails about five or six months.
9. Q. Who was foreman of the shop at the time?
A. W. A. Williams.
10. Q. Is he dead?
A. Yes, sir.
11. Q. What did you do for the company when working for them at Adrian?
1509 A. I worked on rails, as near as I can recollect, from four to five months. The balance of the time I worked on car-work and road-work.
12. Q. Describe what you did to the rails in mending them; in what different ways you mended them?
A. Well, we put a patch on top; repaired the top of the rail; put on the flanges when necessary.
13. Q. What else, if anything, did you do to mend rails?
A. Cut off some and straightened some.
14. Q. Did you sometimes mend the extreme end of the rail in any other way than by patching on the top; if so, how?
A. We put a Dutchman in, sometimes, instead of the patch.
15. Q. State from your best recollection what proportion of the rails repaired you cut off at the end?
A. About one-fifth, I believe, as near as I can say.
16. Q. What proportion did you straighten?
A. About one in ten, I should judge.
17. Q. What proportion did you mend in the flange?
A. I should say about one in ten, as near as I could judge.
18. Q. What proportion did you mend by putting in what you call a Dutchman?

A. Probably three in ten.

19. Q. How much actual mending, counted in inches, would it amount to when you mended in that way?

A. It counted six inches.

20. Q. When you say you counted six inches, what do you mean by it?

A. In repairing rails our rule was where I worked we didn't never charge less than six inches.

21. Q. In that case how much was the actual length of mend, not the estimated, reported mend.

A. Well, it would not be (½) one-half of that.

1510 22. Q. Have you worked in any place besides La Porte and Adrian?

A. At Elkhart.

23. Q. When, and how long, as near as you can now state?

A. I could not say just when, but I can tell you how long; not quite two years; about that; nearly a year and ten months.

24. Q. In the same business?

A. Yes, sir.

25. Q. Does the evidence you have given apply equally to the work done at Elkhart, and as to that done at La Porte and Adrian?

A. Much the same.

26. Q. During all this time, how many rails did you mend in a day at one fire with a blacksmith and two helpers on an average; or state the facts in regard to the rail-mending?

A. In regard to rail-mending some rails are better than others; can be mended more easily, because they are not so much broken, therefore we could mend more of them. After the best are mended we cannot mend so many. I should think from six to eight would be an average day's work.

27. Q. On these six or eight, how many inches of actual patching of the head was there, as nearly as you can state?

A. About a hundred inches.

28. Q. In cutting off the ends of rails, did you make any use of the jaws?

A. No.

29. Q. In mending the flanges, did you use them, or how did you mend the flange?

A. At Elkhart we had a flange-jaws we used there.

30. Q. What did you use at the other places?

A. We used a slot—a cavity—of the form of the end of the rail and put in a piece.

31. Q. Was there any difference in the convenience of using one way or the other; if so, which was the more convenient?

A. I could not see that there was much difference.

1511 Cross-examination by Mr. Curtis:

1. X Q. You were asked, in your direct examination, what proportion of rails you cut off while at work at Adrian. What did you answer?

A. One in ten, I should think.

2. X Q. Don't you know what you answered?

A. I believe that was it.

3. X Q. Did you answer one in five or one in ten; which?

A. I might have got the flanges in the rails' place.

4. X Q. Do you know what you replied to that question?

A. Well, I really could not say just now.

5. X Q. Did you testify that one in five was cut off?
A. I really might have; I could not be certain.
6. X Q. You might have testified so?
A. I might have testified so.
7. X Q. Yes?
A. I might have.
8. X Q. You cannot tell whether you stated one in ten or one in five, can you; if you can, which did you say?
A. I think it was one in ten; really I could not testify.
9. X Q. You are not sure about it?
A. No, sir.
10. X Q. Were you asked what proportion of the rails were straightened, or were you not asked that question?
A. Yes, sir; I was.
11. X Q. What proportion did you state was straightened?
A. That was the question I should have given; it was one in ten; I have got a little mixed.
12. X Q. We will go back to what was cut off. What proportion of the rails did you tell us were cut off?
A. Well, there was one in ten, I think.
13. X Q. You told us one in ten, did you, were cut off?
A. I think so.
1512 14. X Q. Do you know what you did tell us?
A. Well, I could not say just now, in fact.
15. X Q. You cannot tell; what do you want to make your answer as to the proportion of rails cut off?
A. One in ten.
16. X Q. You think that is what you stated before, do you?
A. I am not positive, but I should think so.
17. X Q. Well, did you testify as to what proportion of the rails were mended in the flange; do you remember whether you were asked anything about that?
A. Yes, I was asked that question.
13. X Q. And what did you say in answer?
A. One in five, I should think.
19. X Q. You think you stated one in five?
A. One in ten.
20. X Q. Will you swear that that was what you said?
A. I really could not.
21. X Q. Will you swear you did not say that there was more than that proportion mended in the flange?
A. I could not swear.
22. X Q. You cannot swear that you did not formerly testify that there was more than that? Can you swear how many were mended in the flange now, and from what do you swear?
A. Well, I should say one in eight. (The question was read to the witness.) Well, I said one in eight.
23. X Q. Will you please hear the closing portion of my question—read and answer it? (Question reread to witness.)
A. One in eight.
24. X Q. From what do you swear?
A. I swear to this what I have stated.
25. X Q. Didn't you just tell us that one in ten was mended on the flange?
1513 A. Well, I did; but I got kind of mixed up, and I suppose I don't get things just right.

26. X Q. Didn't you just now tell us that one in eight was mended on the flange?

A. Yes, sir.

27. X Q. Have you the same guide for making one statement as the other?

A. I could not say at the time.

28. X Q. Were you asked on the direct examination what proportion of rails you put Dutchmen into?

A. Two in six, I think.

29. X Q. Are you sure that that is what you answered formerly?

A. I am not sure.

30. X Q. Now, how many were mended in the flange?

A. One in eight.

31. X Q. How many were cut off at the end?

A. One in ten.

32. X Q. How many were straightened?

A. Well, I should think one in ten.

33. X Q. And how many had Dutchmen put into them?

A. One in six.

34. X Q. Are you willing to testify now that you didn't say, on the direct examination, that one-fifth were cut off at the end?

A. I think not.

35. X Q. You are certain that you didn't so certify, are you?

A. Well, you have bothered me a little bit, I guess; that's all.

36. X Q. Will you swear that you did not testify that Dutchmen were put into three-tenths of the rails?

A. Yes, sir; three in ten.

3 . X Q. Did you so testify, or did you not?

1514 A. Yes, sir.

38. X Q. Afterwards you testified two in six, and afterwards one in six, did you not?

A. I could not fairly say much. I guess you have come round on me a little sharp and mixed me up a little.

39. X Q. Now, will you swear that you didn't testify that seven-tenths were mended in the flange?

A. I cannot answer just now.

40. X Q. How many were cut off?

A. I could not answer just now.

41. X Q. How many were mended in the flange?

A. One in six, I believe.

42. X Q. How many had Dutchmen put into them?

A. Well, you have repeated those questions so much, I cannot answer; that is all.

43. X Q. Do you recollect what statements you have made in regard to the number cut off, or the number mended in the flange, or the number which had Dutchmen put into them? If so, state what your previous statements have been.

A. Well, I cannot make any more statements just now. I think you have asked me enough questions just now.

44. X Q. Will you swear you mended any on the top, when you come to think over it?

A. Yes, sir.

45. X Q. Are you sure what proportion you mended on the top?

A. What proportion of the rails?

46. X Q. Yes; what proportion of the number of rails you mended on the top, and how do you come at that result?

A. One hundred inches.

47. X Q. That is what you called a day's work; that has nothing to do with what I am asking you. I asked you about the proportion of rails mended on the top. Do you know, how do you know, and what do you know?

1515 A. You mean the number of inches or the number of rails?

48. X Q. No; the proportion of the whole number of rails you worked on which you mended on the top?

A. In one day?

49. X Q. It has nothing to do with one day; but what proportion you mended on top?

A. I don't thoroughly understand the question.

50. X Q. Into how many rails did you put Dutchmen?

A. These questions have all been asked before to me; I desire you would not keep on to them all the while.

51. X Q. You must allow me to determine about that; please answer the question; will you please answer my last question?

A. I would not like to answer any more questions; would rather you let me go.

52. X Q. That is not for you to determine; you are on the stand to answer such questions as I put, provided they are legal and proper; I will ask you the question; have you answered the question?

A. No, sir.

53. X Q. Do you wish to decline to answer?

A. Yes, sir; I would rather decline.

Redirect examination by Mr. Payson:

32. Q. Are you hard of hearing?

A. Yes, sir.

Recross-examination by Mr. Curtis:

54. X Q. Did you hear the questions I asked you?

A. Yes, sir; I did.

(Signature waived by consent of counsel.)

1516 NATHAN REEVE.

1. Q. Please state your name, age, residence, and occupation.

A. Nathan Reeve; age, 56; residence, Chicago; occupation, lawyer.

2. Q. Have you had in your possession the ten tabular statements made exhibits in this cause, in the deposition of N. Cornell; and, if so, state whether you have added up the amounts in those exhibits?

A. I have; I added up the number of rails and the pounds of iron reported in those statements.

3. Q. State the result.

A. On the twenty-seven reports, thirteen thousand and thirty-seven rails, twelve thousand six hundred and thirty-four pounds of iron used; on the ten reports, there were one thousand eight hundred and twelve rails mended, and one thousand five hundred and thirty-one pounds of iron used.

4. Q. Which of the twenty-seven do you refer to?

A. Those signed by Snodgrass.

5. Q. The twenty-seven that have been identified by Mr. Cornell, are they?

A. Yes, sir.

6. Q. Have you any other reports besides the twenty-seven and the ten referred to?

A. I took all the other reports that were made by Reed, Snodgrass, and others, and found eleven thousand eight hundred and ninety-two rails mended, ten thousand eight hundred and nineteen pounds of iron used.

7. Q. As shown by said reports?

A. Yes, sir.

8. Q. Are these the reports called for by the complainant?

A. Yes, sir.

(Signature waived by consent of counsel.)

1517 OTIS GRAVES.

1. Q. Please state your name, age, residence, and occupation.

A. Otis Graves; age, 30; residence, Summit; occupation, blacksmith.

2. Q. In the employ of what company?

A. The Chicago & Alton Railroad Company.

3. Q. How long have you been in their employ?

A. About nine years.

4. Q. In the blacksmith-shop?

A. Yes, sir.

5. Q. During that time what have you had to do with the mending of rails?

A. I was mending rails, I guess, about six months; may be a little longer.

6. Q. Yourself?

A. Yes, sir; mended rails, and other jobbing together.

7. Q. What have you done during the rest of the time?

A. Have been making frogs, and doing general jobbing together.

8. Q. During what portion of the time have rails been mended in your shop?

A. Well, about seven years, I think.

9. Q. How often have you been in the shop during those nine years—how often have you been in the shop?

A. I have been in the shop every day, unless I was sent off on some job.

10. Q. What have you had to do at mending rails in your shop, during this whole time?

A. Part of the time I was cutting off rails and putting on patches.

11. Q. Who was foreman of the shop there at that time?

A. Dan Rooney.

12. Q. What attention have you paid to the patching of rails by other men in your shop?

A. I have seen them work every day.

1518 13. Q. From your knowledge of the business, what would you say was a fair day's work of solid patching in feet, making no allowances for any other mending?

A. I have not seen any man patch the whole day in that shop; I do not know what they would do.

14. Q. If they did work the whole time, what would they be able to do, according to what you have seen, as a fair day's work, in inches?

A. I think it would keep a man pretty busy to put on one hundred inches; he would oftener put on less than he would more; there is a difference in patching if a man has three or four helpers than when he has but one or two.

15. Q. I mean when a man has two helpers; is that what you mean?

A. Yes, sir.

16. Q. Some witnesses in this case have spoken of mending two hundred and eighty inches in a day; what is your judgment of that?

A. They might have different fires in their shop; our fires were very small.

17. Q. How much can you do here at your fires, at one heat?

A. At one heat—at one time—about seven to eight inches they could put on of solid patching.

18. Q. Does it make any difference as to the amount of patching how long the patches are; can you put on more with short patches or with long patches?

A. We can do more with short patches—more feet in a day with short patches than long ones.

19. Q. What was the average length of patch in your shop to the rail?

A. We very seldom put on a patch over fifteen or sixteen inches long; that would be in the center.

20. Q. What would be the shortest?

A. From three to four inches.

1519 21. Q. What would be a fair average for a single patch?

A. The average on the rails in our shop was about six or seven inches.

22. Q. What proportion of the rails were actually patched and not cut off?

A. There was not over one-half that went into our shop that was patched; not over that.

23. Q. What was done to the remainder?

A. They were cut off.

24. Q. How many fires were there, sir, in your shop?

A. There was one fire; that is, that worked at the rails.

25. Q. Was there ever more than one fire engaged in mending rails?

A. There was three fires; one of these might probably turn in for a day when there was a hurry.

26. Q. Generally there was only one fire?

A. Only one fire.

27. Q. How much time was that fire—what proportion of the time was that fire so engaged?

A. While I was in the shop?

28. Q. During the nine years you have been there?

A. There would be days that it would be doing something else.

29. Q. How often did that happen?

A. May be twice or three times a week; may be once or twice or three times a week; it took a man a good deal of time to straighten them.

30. Q. You had rails straightened in your shop?

A. Yes, sir.

31. Q. What did you use to straighten them?

A. Strikers.

32. Q. Did you put them in the jaws to straighten them?

A. No, sir.

33. Q. Did you put them in the jaws when you wanted to cut them off?

1520 A. No, sir.

34. Q. How did you cut them?

A. Cut them on the top of the block.

35. Q. Do you know whether any complaint was made that you did not do as much work in your shop as they did in others?
A. There was no complaint made that I know of.
36. Q. Did you ever work on any other road?
A. No, sir.
37. Q. What is your division?
A. Division one.
38. Q. Did you make out any reports of the whole work done in your shop?
A. On rails?
39. Q. Yes, sir.
A. I never did.
40. Q. Were they made out in that shop?
A. Yes, sir.
41. Q. Did you see any of those reports?
A. Yes, sir.
42. Q. Who made them out?
A. Mr. Rooney.
43. Q. What did you do with them?
A. Sent them to the road-master.

Cross examination by Mr. Curtis:

1. X Q. Did you keep an account in which you carefully put down the number of rails cut or straightened, as distinguished from the number of rails patched?
A. No, sir.
2. X Q. There was no such account kept, was there?
A. No, sir; no distinction, I believe, between patching and cutting off.
1521 3. X Q. During the first six years you worked for the Chicago & Alton Road, what wages did you get?
A. Myself?
4. X Q. Yourself.
A. I think about the first year I got two dollars, then I was raised to two and a half.
5. X Q. What wages did you get during the few months you worked at patching rails?
A. Two dollars and a half.
(Signature waived by consent of counsel.)

J. T. BARNET.

1. Q. Please state your name, age, residence, and occupation.
A. J. T. Barnet; age, 40; residence, Decatur; occupation, blacksmith.
2. Q. How long have you been engaged in the blacksmith business?
A. Eighteen or twenty years.
3. Q. Repair any rails for any railroad company; and if so, where, and for what company?
A. I repaired for the Illinois Central Railroad Company, and the Toledo & Wabash Company.
4. Q. Where did you repair for the Illinois Railroad Company, and for how long?
A. In Decatur, Illinois, for about a year.
5. Q. When did that work commence, and when did it end?
A. It commenced in 1868—March, 1868; continued until 1869, in February; not quite a year.

6. Q. Did you have charge of the shop?
A. Yes, sir.
7. Q. How were you employed—by the day or by the contract?
1522 A. By the day.
8. Q. During this time, did you cut off and straighten rails without patching on the top?
A. Yes, sir.
9. Q. Did you keep account of the number of rails that you mended in the shops?
A. Yes, sir; we kept an account.
10. Q. How was it kept, by bars, or in feet and inches?
A. It was kept by the bars; so many bars repaired.
11. Q. Did you keep also the number of feet and inches repaired?
A. Yes, sir; I think we did.
12. Q. How did you estimate for the rails that were simply straightened, or cut off, without being patched?
A. Six inches for cutting or straightening, counting that as much as if we laid on so much patch.
13. Q. Did you frequently repair rails without putting on any patch?
A. Yes, sir; where the rail was not damaged very much we used to put in a Dutchman.
14. Q. Did you use the block for that purpose?
A. No, sir; we never used it for that purpose.
15. Q. How did you cut off rails?
A. We cut them on the smooth part of the block.
16. Q. In your judgment, as blacksmith, were the jaws of any use in cutting off and straightening rails?
A. Never, for me.
17. Q. What proportion of rails that were brought into the shop to be repaired were either cut off or straightened, or simply fixed at the end without being patched at all?
A. I think one-fourth.
18. Q. Would it be your judgment that one-fourth of the rails were simply cut off or straightened without being patched?
A. I think that was, in my shop.
1523 19. Q. And for these operations you do not use the jaws at all?
A. No sir.

Cross-examination by Mr. Curtis:

1. X Q. Are you now in the employ of Illinois Central Railroad Company?
A. Yes, sir.
2. X Q. Do you know, or did you ever have an interview with Mr. Whipple, who sits there? (Indicating.)
A. I never saw him before.
3. X Q. Did you keep an account of any sort, by referring to which you are enabled to state definitely and accurately what proportion of rails were cut off and not patched; if so, where is that account?
A. I have no account—no accurate account.
4. X. Q. No account that showed that?
A. It did show it; it may have been preserved by the supervisor.
5. X Q. When did you see it last?
A. Not since I left the road.
6. X Q. How long ago was that?
A. In 1868 or 1869.
7. X Q. You sent them to whom?

A. To the road supervisor.
8. X Q. Who was he?
A. Mr. Stiles.
9. X Q. That showed the figures accurately—that would give the number of rails accurately that were patched?
A. Yes, sir.
10. X Q. And how many inches you put on?
A. Yes, sir.
(Signature waived by consent of counsel.)

1524 JOHN J. WIEBER.

1. Q. Please state your name, age, residence, and occupation.
A. John J. Wieber; age, 36; occupation, blacksmith; residence, Mt. Vernon.
2. Q. How long have you been a blacksmith?
A. About eighteen years.
3. Q. What business were you engaged in from 1862 until the early part of 1869?
A. Blacksmithing, repairing rails.
4. Q. Where, and for what company?
A. The Illinois Central Railroad Company.
5. Q. How were you employed by the company?
A. By the day.
6. Q. How many fires were in operation in your shop?
A. When I got there, there was one; in later years, we had two.
7. Q. Did you use any kind of jaws for welding rails that were being repaired?
A. Yes, sir.
8. Q. Were rails being cut and straightened without being patched at the shop whilst you had charge of it?
A. Yes, sir.
9. Q. Did you have charge of the shop yourself?
A. Yes, sir; I had charge of the shop.
10. Q. Did it frequently happen that you cut off rails, or simply straightened them without patching them at all?
A. Yes, sir.
11. Q. Have you any accurate means of determining the number of rails that were simply cut off at the shop?
A. I have no record. I made up my account and handed it in to the division engineer. There was a good many cut off.
12. Q. From your recollection, please state, as near as you can,
1525 the proportionate number of rails, as compared with the whole number, that were cut or straightened, without being patched.
A. During that time?
13. Q. During that time, taking all the time.
A. There was more or less cut every day.
14. What proportion of the whole number was cut?
A. I should think we cut about four or five a day.
15. Q. What proportion of the whole number would that be, one-half, one-fourth, or one-fifth; what is it?
A. About one-fourth.
16. Q. Is it your judgment that one-fourth of the rails were cut off?
A. Yes, sir; we cut over that, I think.
17. Q. Were accounts kept in feet and inches of the work done?
A. Yes, sir.

18. Q. What allowances were made for simply cutting off a rail?
A. Six inches.
19. Q. Were rails sometimes cut off at both ends?
A. Yes, sir.
20. Q. Did you ever straighten rails?
A. Yes, sir; a few.
21. Q. What allowances were made for straightening a rail?
A. That was according to how many times we heated it.
22. Q. If you heat it but once, how much did you count?
A. Counted six inches on the end heated.
23. Q. Did you use the jaws in cutting or straightening the rails?
A. No, sir.
24. Q. What is your judgment, as a blacksmith, of the advantages of the jaws for the purpose of cutting or straightening rails?
1526 A. I do not think there is any advantage in the jaws for cutting and straightening the rails.
25. Q. How do you cut your rails?
A. I cut them on the side, lay them on the swage-block.

Cross-examination by Mr. Curtis:

1. X Q. Some of the rails you cut off at one end were mended at the other?
A. No, sir: we cut off the other end.
2. X Q. What did you do with this end—the end that was not the other end; did you simply mend that?
A. If it was cut at one end, we cut off one end.
3. X Q. Did you never cut off one end and mend the other by patching?
A. Sometimes; sometimes cut off both ends; sometimes mended one end and cut off the other end.
4. X Q. How much were you paid yourself?
A. For wages? Well, I was paid two dollars and seventy-five cents; then three dollars; then three dollars and twenty-five cents.
5. X Q. What were the helpers paid?
A. One dollar and seventy-five cents, or one dollar and seventy cents.
6. X Q. Did you ever know of any actual account being kept in that shop in figures, and figure it up to see how many rails were cut off in a day?
A. I think we kept an account. I do not know about its being figured up. I think there was no account kept of the number of rails at all until 1868.
7. X Q. Down to 1868 you had no account that showed that?
A. No, sir; not down to 1868.
1527 8. X Q. Did you ever take any account and endeavor to find what proportion of the whole number of rails mended in a day you cut off?
A. I kept an account; we sometimes cut off from four to six; sometimes none.
9. X. Q. Sometimes you mended rails in the middle?
A. Yes, sir; sometimes a small patch.
10. X. Q. Did you mend fish-plate rails yourself; did you mend fish-plate rails as well as T rails?
A. I did not mend many fish-plate rails.
11. X. Q. Are you a good blacksmith?
A. Yes, sir.
12. X. Q. You did good work while you were there?
A. I suppose they were satisfied with me.

13. X. Q. How many rails did you yourself average in a day?
A. Sometimes we got out eighteen or twenty; if we had a good deal of cutting to do, we made from fifteen to eighteen, or twenty—along there.
15. X. Q. Did you work on anything except the jaw-block?
A. Yes, sir.
16. X. Q. On the common anvil?
A. The swage-block; about two feet square.
17. X. Q. You mended rails on it, did you not?
A. We did.
18. X. Q. Where?
A. At Detroit.
19. X. Q. How long did you work there?
A. I learned my trade there; was there eighteen years ago.
20. X. Q. Do you like that block better?
A. Well, it makes a good job.
21. X. Q. You had rather work on it?
A. I could get along with it.
1528 22. X. Q. Would you rather work with it?
A. I would, just the same.
23. X. Q. You have worked on both; now, which do you like the best?
A. I could not tell much of a difference in the mending of rails?
24. X. Q. Do you think you can mend more inches on the common block than on the machine, you yourself?
A. I do not think I could mend any more on it.
25. X. Q. You do not think you can mend any more?
A. No.
26. X. Q. How many inches can you mend in a day—close figuring?
A. I have never figured so closely.
27. X. Q. You kept an account, you say; mended from twenty to twenty-two feet; sometimes turned out more rails than that?
A. That was while we were working by the day.
28. X. Q. You did not use the common anvil at all?
A. No, sir.
(Signature waived by consent of counsel.)

T. B. BLACKSTONE.

1. Q. Please state your name, age, residence, and occupation.
A. Timothy B. Blackstone; age, 41; residence, Chicago; occupation, construction and operation of railroads.
2. Q. Are you connected with the Chicago & Alton Railroad in any way?
A. I am, sir, as president of the corporation.
3. Q. For how long?
A. Since 1864.
4. Q. Are you one of the defendants?
A. Yes, sir.
1529 5. Q. Please state what you know in regard to the mending of rails upon the Chicago & Alton Railroad.
A. Your question is a very broad one.
6. Q. What I want to get at is the number of rails so mended, the amount of mending on them, the reports made concerning it, and the cost.
(Objected to.)
A. I have before me a memorandum of the estimated number of rails

repaired by the employés of the Chicago & Alton Railroad Company, from May 1st, 1865, to December 31st, 1869. The estimated number in 1865 is eighteen thousand eight hundred, (18,800;) for 1866, the number is twenty-eight thousand five hundred and thirty; for 1867, the number is twenty thousand seven hundred and four; for 1868, the number is twenty-four thousand two hundred and fifty-two; for 1869, the number is twenty-five thousand seven hundred and forty. We have no data from which I can arrive at the number repaired in 1870; but, if we estimate that the repairing continued in the same proportion, or at the same rate that it had for four or five years previous, the number of rails repaired from the 1st of January, 1870, to the 9th of September, (which time, I understand, you wish to include,) taking the average of previous years, would be sixteen thousand seven hundred and forty-four. But it is my opinion the latter number would be too large, for the reason that in 1870 we were preparing to repair rails by the Bain rollers, and for that reason repaired a smaller number than we would have done under other circumstances. As to the manner of mending these rails, a portion of them were mended by the use of what is called, I believe, the Cawood swage-block; as to the precise proportion, it is impossible for me to state, but in my opinion about two-thirds of the whole number were mended by the use of that machine, judging from the best information I have on that point. It was the practice to report monthly the number of mended rails, or the rails which were taken to the
1530 repair-shops, including those that were simply straightened, as well as others that simply had the ends cut off. As to the cost, I have no record from which I can determine it. I could only state from recollection, which would not be very reliable.

7. Q. Did you mend as many rails during the last part of the time previous to September, 1870, in proportion, as you had been mending during the time covered by that schedule?

A. No, sir, I think we did not.

8. Q. What reason have you for thinking you did not?

A. The reason I think I have already stated, that we were preparing to mend by a different method, that method being considered a better one and cheaper than the way we had been mending; we allowed the old rails to accumulate with the intention of repairing them by that method.

9. Q. Intending to mend on the Bain rollers when you got it ready?

A. Yes, sir.

10. Q. Was there any other reason which you can suggest?

A. Yes, sir; experience had taught us that it was of doubtful expediency, and we finally came to the conclusion that it was not advisable to mend them at all; that there was no economy in doing so.

11. Q. Have you seen the answer filed by the Chicago & Alton Railroad Company in this case?

A. I have not examined it.

12. Q. Did you sign that answer?

A. No, sir.

13. Q. Do you know who signed it for you?

A. I am advised that Mr. Church did. I don't know from my own knowledge.

14. Q. Where were you at the time?

A. I am unable to state.

15. Q. Who was Mr. Church?

1531 A. He was the attorney of the Chicago & Alton Railroad Com-

pany; if the date of the answer was in the latter part of 1868, I was not in this country.

16. Q. In the statement which you have just presented, were the total number of rails given?

A. I have made the footing and given it by years.

17. Q. Does that contain all the rails that were repaired, or simply those that were mended by patching on the Cawood block?

A. These contain all the rails that were repaired, and those that were simply straightened.

18. Q. How was it with those that were cut off?

A. They were also included.

19. Q. Will you state whether that was the general usage along the road?

A. So far as my knowledge extends, it was.

20. Q. How were these reports made from the different divisions?

A. They were made by the men in charge of the different shops, to the chief engineer, and by him reported to the general superintendent and president.

21. Q. How often were they made?

A. The chief engineer's report was annual.

22. Q. From what did the chief engineer make up his reports?

A. From the returns of the men in charge of the work.

23. Q. What practical knowledge have you as to the expediency of mending rails?

A. The knowledge I have is derived from quite a long experience in the operation of railways; and, as I have before stated, we came to the conclusion that it was not expedient to mend them.

24. Q. What objection, if any, is there to mending rails?

1532 A. One particular objection is, that the rail is very likely to break just at the point where the mending is done, or right at the point of junction between the mended portion and that which is not mended.

25. Q. Why is that?

A. I suppose it is owing to a change in the iron, which is brought about by the heating process. The use of the rail in the track causes it to become granulated, and the heating causes it to become fibrous and tougher, and the strain upon that portion of the rail, right at the point of contact between the old and new iron, causes it to break.

26. Q. What means of knowledge have you as to the number of rails mended or repaired upon your road?

A. The best means is from these reports made to the engineer, and by him to myself.

27. Q. Will you please state what these reports indicate, as to the amount of mending, and the number of rails?

A. I have already stated the number of rails, according to the best data.

28. Q. Do your monthly reports give the length of each patch?

A. The total amount of patching.

29. Q. Have you any data from which you can give the precise amount put upon each rail?

A. I have only the total.

30. Q. What would you say would be the amount, in your opinion?

A. My opinion would be that the average would be from six to nine inches for each rail patched, on an average; not the average of the whole number of rails, as I have already stated that one-third of the rails repaired were not patched at all.

31. Q. How satisfactory and careful has been your observation in regard to that matter?

A. It has been a part of my duty to look after the mending of rails, so far as possible; my observation has led me to conclude that
1533 in the majority of cases, where the end of the rail is battered down for two or three inches, that it may be restored by patching that end of the rail, or inserting a wedge-shaped piece; that process never extending more than three or four inches, can be reasonably done; in such cases the mending is done; in other cases it would be longer; but in these cases it would seldom reach more than seven or eight inches.

32. Q. Do you know the total amount of iron in weight used in mending rails?

A. Do you mean for patching rails?

33. Q. Yes, sir.

A. I do not, sir.

34. Q. How many rails are there, on an average, to a ton?

A. That, of course, depends upon the weight per yard. The best estimate I have been able to make upon that point with reference to our road, taking into account the different sizes, the average would be about six and one-half to the ton.

35. Q. Do those reports you have spoken of show the total amount of iron?

A. Yes, sir; it must give the total amount in tons and the number of rails. When the number of rails is shown it has been estimated in that way, allowing six and a half rails to the ton, or about that, not precisely that in all cases.

36. Q. Assuming six and a half rails to a ton, how does the number shown by the reports agree with the number of rails stated in the answer?

A. I could not answer that question without making a calculation.

37. Q. You have not made that calculation?

A. No, sir; I can give you the number of tons as shown by our reports, from which that result could be deduced, if you desire it.

38. Q. Will you please do it, then?

A. In 1865, two thousand two hundred and seventy-six and a
1534 half tons; in 1866, four thousand three hundred and nineteen tons; in 1867, three thousand two hundred and sixty tons; in 1868, three thousand six hundred and eighty tons; in 1869, three thousand nine hundred tons; in 1870, I am unable to state.

39. Q. Have you any knowledge of how much or about how much it has cost the company to mend rails during this period?

A. About how much it has cost to mend them by that process?

40. Q. Yes, sir.

A. The company at one time had a contract at eighty-five cents a foot, I think; that is my recollection; that contract was terminated, for the reason that the party was unwilling to continue at that rate, so that I conclude from that that there was a very little profit at that price. That is the best data we have. I don't think the cost has been very carefully kept since that; we have no record of it.

41. Q. With whom was that contract made?

A. With a man by the name of Ragland.

42. Q. Was it eighty-five cents a foot, or eighty-five cents a rail?

A. My recollection is eighty-five cents a foot; I am not quite positive on that point, but that is my recollection, sir.

43. Q. Is the Chicago & Alton Railroad Company mending rails at the present time?

A. No, sir.

44. Q. Why not?

A. For the reason that I have already stated, that we didn't think it economy to do so.

45. Q. How were you mending rails; with what appliances at last?

A. We used the Bain roller for a considerable time; I cannot state the time precisely.

46. Q. How many of these machines had you?

A. We had only one.

1535 47. Q. How much did that cost?

A. I could not state precisely. My recollection is from forty to fifty thousand dollars.

48. Q. How much more work could you do in a day than you had been doing?

A. I could not state precisely the number of rails mended. I think we would be able to mend at least twenty times more than the swage-block.

49. Q. Where was the machine in use?

A. At Bloomington.

50. Q. Is it in use at the present time?

A. We are not using it at the present time.

51. Q. From what was that estimate that you brought with you taken?

A. It was taken from my own annual report to the stockholders and directors.

52. Q. What has become of the general books of the company up to the time of the great fire?

A. They were destroyed by the fire.

53. Q. You have stated that you mended less during the period preceding September, 1870; can you state how much less than you had been previously mending?

A. No, sir. I could not state definitely.

54. Q. What, in your judgment, would be the difference?

A. I should say about one-half.

55. Q. You did not think it worth while to mend rails, even on the Bain machine?

A. No, sir.

56. Q. Do you know anything about its use on other roads?

A. I know that it has been used on other roads; whether it is being used, I am unable to say.

57. Q. Can you, of your own knowledge, state what would be a fair day's work in mending rails on the Cawood block, in feet and inches of solid patching?

1536 No, sir. I could not speak confidently on that point.

58. Q. Do you know what amount has been reported from the several shops on the road?

A. No, sir. I could not state definitely.

59. Q. Do you think of, or can you state any other matter or thing that would be of benefit or advantage to either litigant in this case?

A. I don't think I can, sir.

60. Q. Have you stated what proportion of all the rails returned as repaired were actually mended upon the jaws?

A. In my opinion about two-thirds of the whole number of rails were mended on that machine.

61. Q. When you speak of the Cawood machine, what are we to understand by that; what was the machine actually used on your road?

A. The machine that I have referred to was a movable jaw, that embraces the rail to hold it while being mended.

62. Q. Do you know what it was called?

A. No, sir; I don't know that I do. I have always known it by that name.

63. Q. Did you ever see the machine in question?

A. I have seen the machine used on our road. I don't know whether they are in question or not. I suppose they are.

64. Q. Look at the model now shown you, marked "Cleveland vise," or Whitcomb machine, and state whether it is the same.

A. I think this not the same, sir, in all respects.

65. Q. Can you state the difference?

A. My recollection is that the machine, as we used it, had a cam, instead of this right pinion; in other respects, is is very similar.

Cross-examination by Mr. Curtis:

1. X Q. You took your estimate, consulted by you, in conjunction with your annual reports, did you?

1537 A. Yes, sir, mainly.

2. X Q. Did you furnish these reports to the master in this cause?

A. They have not been furnished, to my knowledge.

3. X Q. You don't know anything about that?

A. I could not say; they have not been furnished by me.

4. X Q. The machine you used, by what name—how was it known?

A. I have known the machine by name of swage-block; I had no knowledge of the Cawood block at that time.

5. X Q. My question was how was it known?

A. It was commonly known as a swage-block.

6 X Q. The Cawood swage-block?

A. Cawood was the name used in connection with it.

7. X Q. Did you ever see a day's work done on any machine at mending rails, and measure that work?

A. If you mean whether I have stood beside the machine an entire day, while at work, I should say no, sir.

8. X Q. I mean by what you ever saw and know from your own observation?

A. No, sir; I could not say my observation continued through the whole day.

9. X Q. Did you ever measure any man's work at all?

A. No, sir.

10. X Q. In testifying to-day you have drawn the judgment and inferences which you have given from these reports, have you not?

A. I stated mainly from these reports; I have some recollection of the amount of work done by the road.

11. X Q. Was your recollection based upon such reports as you had occasion to make use of in drawing your conclusions?

A. My recollection is as to the number of machines employed

1538 upon the road before the Bain rollers were used; it is of a general character; I have not attempted to state specifically upon this point.

12. X Q. Well, what was the number of these machines?

A. Did you ask how many machines were used, sir?

13. X Q. What was the number you recollect?

A. I think about six or seven, sir.

14. X Q. Only six or seven?

A. I think about that number.

15. X Q. Which number?

A. I didn't attempt to testify definitely; I think there were about six or seven machines used.

16. X Q. You didn't know that your answer admitted that you used ten, did you?

A. I didn't make the answer, sir.

17. X Q. Do you feel sure how many machines were used by your road?

A. I cannot answer any more definitely.

18. X Q. Is that the extent of your recollection, outside of the reports?

A. Upon what point?

19 X Q. Upon the points covered by the question in the direct examination?

A. The question is too indefinite.

20. X Q. You have stated that you gave the answers you have given from these reports and your recollection; have you any recollection bearing upon the subject, outside of what the reports embody?

A. I have no recollection which would enable me to fix the number of rails, or upon which I would rely so much as upon these reports.

21. X Q. The reports are the most reliable thing you know of?

A. Yes, in my opinion.

22. X Q. Do you know what you paid the men for working on that machine?

1539 A. No, sir; I do not.

23. X Q. Do you know what you paid for coal?

A. I do not recollect precisely, sir.

24. X Q. Do you know how much coal you used?

A. No, sir.

25. X Q. Do you know how many rails you mended?

A. No, sir.

26. X Q. Do you know how many inches you put on the rails of mend, and what it cost?

A. I do not.

27. X Q. What lengths of rail did you use upon your road, sir?

A. Generally from twelve to thirty feet—ranging from twelve to thirty; some short, others long.

28. X Q. How many rails, twelve feet long, did it take for a ton, and how many thirty feet long?

A It would be impossible to tell without data; it would be necessary to have the weight of the rails.

29. X Q. I desire to see whether you know. Will you please state what the weight of an eighteen-feet rail is?

A. What the weight of an eighteen-feet rail is?

30. X Q. Yes; a fish-joint rail.

A. That would depend upon the size. Some weigh forty-two pounds, and some sixty pounds.

31. X Q. You used the T-rails?

A. We never used any others.

32. X Q. Do you know any distinction between the fish-joint rail and the T-rail?

A. We use a fish-joint rail, which is a T-rail.

33. X Q. You use the old T-rail—the English pattern?

A. We don't use any that we don't understand is a T-rail.

34. X Q. You don't know any distinction between the T-rail and the fish-plate rails?

1540 A. They are both T-rails.

35. X Q. What do your thirty-feet rails weigh, which you put onto the road?

A. We had some thirty-feet rails on the Jacksonville division, which weighed about forty-two pounds to the yard, and we have some that weigh sixty pounds to the yard.

36. X Q. When did you begin to use that class of rails upon the road?

A. Which class?

37. X Q. The last class named.

A. The thirty-feet rails that we laid on the Jacksonville Road were made at Wheeling, and put down upon the track about 1862, I think.

38. X Q. Have you ever personally examined the accounts rendered by road-masters or foremen, or any person in charge of mending rails, showing how much work was done, and what the work was?

A. I have examined such accounts for my own information.

39. X Q. When did you make such examination?

A. It was several years since?

40. X Q. Recently you have not examined them?

A. No, sir.

41. X Q. In connection with that matter you have looked at these reports. Is that all?

A. In this connection my answers were based mainly upon these reports and the figures I found there, and my knowledge as to the way they were arrived at.

42. X Q. Did you arrive at the number of tons from these reports?

A. I arrived at the number of tons from the reports that were made to me.

43. X Q. The reports showed the number of tons?

A. Yes, sir.

44. X Q. Did they show the number of rails?

1541 A. No, sir; not in all cases.

45. X Q. Did they show the amount of work?

A. No, sir.

46. X Q. Did they show the cost of the labor?

A. No, sir.

47. X Q. Did they show the cost of fuel?

A. No, sir; not in the form they were made to me; I cannot answer as to the original reports.

48. X Q. From the number of tons how do you know the number of rails?

A. As I stated before, I made an estimate from my own knowledge of about the different proportions of the different sizes of rails that were mended; I did not undertake to state precisely.

49. X Q. What were the different dimensions of rails used on your road?

A. We had rails weighing forty-two pounds to the yard and rails that weighed forty-five pounds to the yard; others weighing fifty and fifty-two pounds to the yard; and some weighing fifty-four, fifty-six, fifty-eight, and sixty pounds to the yard; but precisely what proportion we had of each I could not tell.

50. X Q. What number did you take for the divisor of the number of tons to find the number of rails?

A. I could not give you the details of the calculation. I did make such a calculation, and that was the result.

51. X Q. You cannot tell whether that is right?

A. I could not tell whether it is precisely right. I took care to have it correct.

52. X Q. Suppose you were called upon to make such an estimate what number would you divide the number of tons by to ascertain the number of rails?

A. I could answer that by a little calculation.

52. X Q. Please make the calculation?

1542 A. Assuming six and one-half rails to the ton, I would estimate, as a basis of the calculation, a rail from seventeen to eighteen feet with an average of fifty-two pounds to the yard.

53. X Q. You have estimated a certain length in a certain way; did you estimate the same length in the same way before?

A. No, sir; from data which I had before me, I estimated that over certain distances in the road, from which rails were taken for repair, the rails weighed certain amounts, and taking an aggregate, the average of the rails so taken brought out this result.

54. X Q. Where is that data?

A. It is to be found at my office.

55. X Q. Where are the mended rails, the patched rails, laid; in the side-tracks or main-line?

A. They were laid in the side-tracks, and to considerable extent in the main-track.

56. X Q. Where were the cut-off rails laid?

A. Both in the side-tracks and main-tracks; they were considered safer to put in the main-track than patched rails.

57. X Q. Do you think you can find patched rails in the side-tracks?

A. I think there may be some found in the side-tracks; not many.

58. X Q. Were many put in the main-track?

A. Yes, sir; the number would be very considerable.

59. X Q. That was a period when you were short of iron?

A. It was a period when we were short of money, I recollect; I don't recollect particularly about the iron.

60. X Q. During that period you mended all you could, did you not?

A. No, sir; I could not say that we did; for the reason that we considered it a very expensive process.

61. X Q. Was it under compulsion?

1543 A. Yes, sir; we did that because we had not the necessary means to do better; by doing better I would be understood, putting down new rails instead of old ones.

62. X Q. You mended all you could?

A. No, sir; we could have mended all of them.

63. X Q. During that period, when you were short of money, do you think that there were any rails that you could have mended, that you did not mend?

A. Yes, sir.

64. X Q. Why didn't you mend them?

A. Because we didn't think it was economy to do so.

65. X Q. Such rails as you thought it paid to mend, you mended, didn't you?

A. To a certain extent.

66. X Q. What portion that you thought it would pay to mend, did you not mend?

A. I could not state precisely.

67. X Q. What iron are you now using on your road?

A. We are using steel; we are not putting down any new iron.

68. X Q. When did you begin to lay steel rails?

A. In October, 1865.

69. X Q. You are not now putting down any new iron?

A. Not at present.

70. X Q. Do you know whether any of your shops steel-point frogs by putting steel along the side of the rails, to make the frogs?

A. We have been using steel rails.

71. X Q. That is not an answer to my question, because I understand that in making steel frogs you don't use the machine; but did you not steel the sides of the rails in the frogs and do it on the machine?

A. I cannot say as to that.

72. X Q. You never gave any orders in regard to that?

1544 A. No, sir.

73. X Q. Did you give any orders to the chief engineer?

A. All orders given to the chief engineer are given by the superintendent.

74. X Q. You did not personally give him any orders?

A. Not to him.

75. X Q. How often did you have occasion to examine the reports which came through your hands, relating to the mended rails; more than once a year?

A. We made up an annual report, but it was my duty to look after the mended rails, so far as I could, consistent with other duties; but it was of a general character. I didn't go into details.

76. X Q. Was that duty carried to the extent of going into the shop to see the work done?

A. Well, as often as once a month, sir.

Redirect examination by Mr. Payson:

66. Q. What degree of personal attention were you in the habit of giving to your railroad during the time you have been president of it?

A. I gave all the attention I could possibly.

67. Q. What degree of practical knowledge have you of the affairs belonging to the railroad?

A. Such as I have been able to obtain from about twenty-five years' experience.

68. Q. What practical knowledge have you of mending rails, and what ability have you in mending rails yourself?

A. I have had no personal experience in mending rails, if that is a proper answer to your question. (Question read to witness.) I don't profess to be able to mend rails myself. I have not the practical knowledge to do that, sir.

T. B. BLACKSTONE.

1545 MICHAEL WAGNER.

1. Q. Please state your name, age, residence, and occupation.

A. Michael Wagner; age, 45; residence, Hudson, Mich.; work on the railroad, repairing rails.

2. Q. Are you a brother of George Wagner?

A. Yes, sir.

3. Q. Have you ever worked on the Michigan Southern & Northern Indiana Railroad at mending rails; and when, and where?

A. Well, I worked one year at Cold Water, three years at Hudson, and two and a half years at Adrian; in 1861, 1862, and 1863.

4. Q. Who did you work with at Hudson?

A. I worked in the shop, and during that time there was a foreman; had three men besides me.

5. Q. Did you there work at mending rails, with your brother?

A. Yes, sir.
6. Q. At mending rails?
A. Yes, sir.
7. Q. Did you ever work at the same fire with him?
A. No.
8. Q. What kind of block did you use?
A. We used the old-fashioned block; swage-block.
9. Q. What kind of a block did your brother use at the same time?
A. He used the block, and after a while he got the other block with a lever.
10. Q. While you and your brother were using the smooth block, was there any other kind of machine for mending rails in use in the shop?
A. Yes, the other machine; the jaws.
11. Q. Were they all three kept at work together, at times?
1546 A. Yes, sir.
12. Q. Was there any difference in the amount of work done on one block, from that done on the others?
A. For my own part I would sooner work the old block. I only used the jaw-block about a year.
13. Q. You have worked both?
A. Yes, sir; on the jaw-block I worked only about a year, and threw it one side after that.
14. Q. Can you tell who did the most work, your brother working on the smoot hblock or the other blacksmith working on the jaws; where they both worked in the same shop together?
A. I think George could.
15. Q. Did he?
A. He repaired tools most of the time on the road.
16. Q. When they both worked all day together, which did the most, if there was any difference?
A. I guess George got out one or two more, I think. I was not certain.
17. Q. After working on both of them yourself, will you state on which you can do the most work, if you can do more on one than the other?
A. For my part, I think I can do more work on that block than the jaws-block. I worked on it one season, that is all.

Cross-examination by Mr Curtis:

1. X Q. After you threw out the block you had been using, you went to using one with a lever?
A. Yes; after we used the jaws-block we got one with a lever.
2. X Q. And that had a jaw that moved up to another, did it not?
A. I don't know. I cannot recollect.
3. X Q. You put in the rail and moved up to it, didn't you?
1547 A. We used that machine after the jaws were thrown away.
4. X Q. You used that machine after the jaws were thrown away?
A. Yes, sir.
5. X Q. Did you keep on using it?
A. Yes, sir.
6. X Q. Have you used it ever since you worked there?
A. Yes, sir; after they took away the shop I went to Adrian and I used it there.
7. X Q. How did you like that machine?
A. Liked it very well.

8. X Q. Could you mend more rails on it?
A. I don't know—could not tell.
9. X Q. Which was the better blacksmith, your brother George or the man who worked on the jaw-block?
A. I guess George.
10. X Q. Where are you now employed and by whom?
A. I work for that company, repairing rails.
(Signature waived by consent of counsel.)

JAMES M. HEALEY.

1. Q. Please state your name, age, residence, and occupation.
A. James M. Healey; age, 45; residence, Champaign; occupation, civil engineer.
2. Q. How long have you been a civil engineer?
A. Since 1851.
3. Q. Where have you been chiefly employed?
A. I have been on the Illinois Central Railroad since 1851.
4. Q. Have you had charge of any portion of the road as civil engineer?
1548 A. I have had charge of the middle division, or third division of the main line from the junction at to Kankakee, from 1859 to January 1st, 1872; since then have had charge of the first division, as division engineer.
5. Q. Did the rail-mending on the third division, or any portion of it, come under your general supervision whilst you had charge of it?
A. All that was done on the division was under my direction.
6. Q. Were there rail-mending shops, during the time you had charge of that division, at Champaign?
A. There was a shop at Champaign.
7. Q. How many fires were there in that shop employed in rail-mending?
A. Part of the time one; part of the time two; part of the time three.
8. Q. Can you state the number of rails that were brought into that shop for repairs between 1861 and 1869?
A. I have a memorandum from which I can state. The total number of rails fixed in the shop was fifty-five thousand eight hundred and twenty-eight bars (55,828.)
9. Q. What dates does that include?
A. November 1st, 1861, and April 1st, 1869.
10. Q. Did you continue to mend rails in that shop after the date you have last mentioned?
A. I think we repaired a few bars in June and July—we repaired only a few. After that I think there were none; perhaps I should say July 1st.
11. Q. Then you mean November 1st, 1861, and July 1st, 1869?
A. Yes, sir.
12. Q. Does that include up to the time you suspended rail-mending in your shops?
A. It does.
13. Q. How did you ascertain the number of rails which have been through the shop?
1549 A. By actual count—by report of the men.
14. Q. How were the rails mended in that shop, by days' work or by contract?
A. By contract.
15. Q. This number you gave was the number of rails mended?

A. Yes, sir.

16. Q. Were the rails mended at that shop reported to you as division engineer?

A. They were.

17. Q. To what office did you make your report?

A. To the chief engineer of the Illinois Central Railroad.

18. Q. Were rails cut at that shop during all this time?

A. There were rails cut.

19. Q. Have you any means of determining, for any portion of the time referred to, the number of rails which were cut, simply, without being patched, at that shop?

A. I have an account of the number cut after March 1st, 1868; the number prior to that I have no account of.

20. Q. Without being patched at all?

A. Without being patched.

21. Q. Will you state what the total number of rails is that went through the shop after the time you have mentioned?

A. Eleven thousand three hundred and fifty.

22. Q. What number of these rails were cut without being patched or otherwise treated?

A. Eight thousand five hundred and thirteen.

23. Q. All these were cut—eight thousand five hundred and thirteen?

A. Yes, sir.

24. Q. Were you frequently in and about the rail-shop of the Illinois Central Railroad Company at Champaign?

A. Yes, sir; I was in the shop frequently, once a week, or such a matter.

1550 25. Q. Did you, prior to March 1st, 1868, have occasion to know, of your personal observation, anything as to the number of rails which were cut, and which were patched?

A. I saw the rails as they were repaired, and directed them to be sent out on the road, as they were to be used, but I cannot remember just the number of bars that were cut. I was at the shop, and used to see the rails, and sent them out; presume I saw them every few days.

26. Q. From your observation of the work done in that shop, and of the rails as they came out from the shop, what, in your judgment, was the proportion of rails simply cut, without being patched, as compared with the whole number which went through the shop prior to March 1st, 1868?

A. I should say that one-half of the rails were cut.

27. Q. Without being patched?

A. Without being patched; yes, sir.

28. Q. I will ask you if between March 1st, 1868, and the expiration of the rail-mending business in that shop, there were other rails cut and patched, both which are not included in this statement?

A. There were other rails, not included, cut and patched, but we kept no separate account of those rails, so that we could not tell the number.

29. Q. In settling for rail-mending, for rails mended at the shop, what allowance was made in inches to the mend?

A. The inches that were repaired were called so many inches; and when a bar was cut off, for every cut he was allowed six inches.

30. Q. When the bar was cut he was paid at the rate of six inches for each cut, was he?

A. Yes, sir.

31. Q. How were the rails reported by you to the chief-engineer's office; whether cut, patched, or straightened simply?

A. They were reported as repaired.

1551 32. Q. During the last portion of the time during which you mended rails, did you increase the number of cut rails as compared with those which were patched?

A. As compared with the time previous?

33. Q. Yes.

A. Yes, sir; the longer we repaired, the more bars we cut, owing to the condition of our iron.

Cross-examination by Mr. Curtis:

1. X Q. You had accurate accounts showing what was done upon each rail that went into the shop on your division, after 1868 and up to the expiration of that contract, hadn't you?

A. Yes, sir.

2. X Q. They were in writing, were they not?

A. Yes, sir; kept in pencil in a memorandum-book.

Redirect examination by Mr. Jewett:

34. Q. Have you used this memorandum in arriving at the results which you have stated?

A. Yes, sir.

(The complainant objects to each and every statement of the witness relating to accounts not produced and not proven.)

(Signature waived by consent of counsel.)

DAVID ROWE.

1. Q. Please state your name, age, residence, and occupation.

A. David Rowe; residence, Louisiana, Mo.; occupation, road-master.

2. Q. Road-master of what road?

A. On the ninth division of the Chicago & Alton Railroad—the Missouri division. I was on division six when these rails were repaired.

1552 3. Q. How many rails were mended on that division, if you know?

A. Is it the total number?

4. Q. The total number.

A. There was about from eighteen hundred to nineteen hundred rails mended altogether. There were six hundred and ninety-five rails repaired, patched, etc.

5. Q. How many were cut and straightened?

A. There were twelve hundred and twenty-two.

6. Q. During what period did this extend?

A. During the period from June, 1869, until December, 1870—nineteen months.

7. Q. How many before or after?

A. Not any before or after; the company didn't own the line but a few months before that, and there were none after that.

8. Q. Did you use the jaws for cutting rails?

A. No, sir.

9. Q. Did you use the jaws for straightening rails?

A. No, sir.

10. Q. In making frogs did you use the jaws?

A. No, sir.

11. Q. For steeling frogs?

A. No sir.

12. Q. What was the average length of mend per rail?

A. I think the average length of mend per rail would be about seven and a half inches or eight inches.

13. Q. What proportion of rails were mended on both ends?

A. About one-fourth.

14. Q. What are your means of knowledge in regard to this matter?

A. The blacksmith's reports, and being often in the shop myself. The shop was close by the office, and I was often in the blacksmith-shop.

1553 Cross-examination by Mr. Curtis:

1. X Q. On what do you base your answer as to the number mended and the number cut?

A. On the blacksmith's reports; and the rails were originally longer, and I gave the order to cut them off.

2. X Q. When did you begin to cut the rails down?

A. They were left there before I went there, by the old Jacksonville Company, before the company purchased it.

Redirect examination by Mr. Payson:

15. Q. How often were those reports made to you?

A. Every month.

16. Q. Were they made on a printed blank?

A. Yes, sir.

Recross-examination by Mr. Curtis:

3. X Q. More or less of the rails mended on that division of the road were sent to Bloomington to be mended, were they not?

A. No, not then; the rails that were sent to Bloomington were the sixty-pound fish-plate rail; we never sent the others.

4. X Q. There were rails sent to Bloomington?

A. Yes, but they were sixty-pound rails; we got them from Bloomington, and sent them there to be mended.

5. X Q. Some were sent to Alton, were they not?

A. No, sir; not any by me.

6. X Q. When did you look over those reports last?

A. I looked over them about two weeks ago; I looked them over some to-day.

7. X Q. Where did you see them?

A. I saw them, sir, in the office; I brought them up from my office two weeks ago.

1554 8. X. Q. What blacksmith worked there under you?

A. A blacksmith by the name of Thomas Clelland; he is in Nebraska.

9. X Q. Who were the helpers at that time?

A. We had several helpers; one by the name of Delany.

10. X Q. How many fires?

A. Only one that mended rails.

(Signature waived by consent of counsel.)

W. B. AINSWORTH.

1. Q. Please state your name, age, residence, and occupation.

A. W. B. Ainsworth; residence, Dyersville; occupation, blacksmith.

2. Q. How long have you been a blacksmith?

A. About twenty-five years.

3. Q. Where do you reside?

A. In Dyersville.

A. They were reported as repaired.

1551 32. Q. During the last portion of the time during which you mended rails, did you increase the number of cut rails as compared with those which were patched?

A. As compared with the time previous?

33. Q. Yes.

A. Yes, sir; the longer we repaired, the more bars we cut, owing to the condition of our iron.

Cross-examination by Mr. Curtis:

1. X Q. You had accurate accounts showing what was done upon each rail that went into the shop on your division, after 1868 and up to the expiration of that contract, hadn't you?

A. Yes, sir.

2. X Q. They were in writing, were they not?

A. Yes, sir; kept in pencil in a memorandum-book.

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A. Yes, sir.

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A. On the ninth division of the Chicago & Alton Railroad—the Missouri division. I was on division six when these rails were repaired.

1552 3. Q. How many rails were mended on that division, if you know?

A. Is it the total number?

4. Q. The total number.

A. There was about from eighteen hundred to nineteen hundred rails mended altogether. There were six hundred and ninety-five rails repaired, patched, etc.

5. Q. How many were cut and straightened?

A. There were twelve hundred and twenty-two.

6. Q. During what period did this extend?

A. During the period from June, 1869, until December, 1870—nineteen months.

7. Q. How many before or after?

A. Not any before or after; the company didn't own the line but a few months before that, and there were none after that.

8. Q. Did you use the jaws for cutting rails?

A. No, sir.

9. Q. Did you use the jaws for straightening rails?

A. No, sir.

10. Q. In making frogs did you use the jaws?

A. No, sir.

11. Q. For steeling frogs?

A. No sir.

12. Q. What was the average length of mend per rail?

A. I think the average length of mend per rail would be about seven and a half inches or eight inches.

13. Q. What proportion of rails were mended on both ends?

A. About one-fourth.

14. Q. What are your means of knowledge in regard to this matter?

A. The blacksmith's reports, and being often in the shop myself. The shop was close by the office, and I was often in the blacksmith-shop.

1553 Cross-examination by Mr. Curtis:

1. X Q. On what do you base your answer as to the number mended and the number cut?

A. On the blacksmith's reports; and the rails were originally longer, and I gave the order to cut them off.

2. X Q. When did you begin to cut the rails down?

A. They were left there before I went there, by the old Jacksonville Company, before the company purchased it.

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16. Q. Were they made on a printed blank?

A. Yes, sir.

Recross-examination by Mr. Curtis:

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4. X Q. There were rails sent to Bloomington?

A. Yes, but they were sixty-pound rails; we got them from Bloomington, and sent them there to be mended.

5. X Q. Some were sent to Alton, were they not?

A. No, sir; not any by me.

6. X Q. When did you look over those reports last?

A. I looked over them about two weeks ago; I looked them over some to-day.

7. X Q. Where did you see them?

A. I saw them, sir, in the office; I brought them up from my office two weeks ago.

1554 8. X. Q. What blacksmith worked there under you?

A. A blacksmith by the name of Thomas Clelland; he is in Nebraska.

9. X Q. Who were the helpers at that time?

A. We had several helpers; one by the name of Delany.

10. X Q. How many fires?

A. Only one that mended rails.

(Signature waived by consent of counsel.)

W. B. AINSWORTH.

1. Q. Please state your name, age, residence, and occupation.

A. W. B. Ainsworth; residence, Dyersville; occupation, blacksmith.

2. Q. How long have you been a blacksmith?

A. About twenty-five years.

3. Q. Where do you reside?

A. In Dyersville.

4. Q. Where did you live from 1862 to 1869?
A. In Champaign City.
5. Q. In this State?
A. Yes, sir.
6. Q. What were you doing there at that time?
A. Repairing rails.
7. Q. For what company?
A. The Illinois Central.
8. Q. Did you do it by the day, or by contract?
A. By contract.
9. Q. Did you cut rails at that shop during any of that time?
A. Yes, sir.
10. Q. Did you keep an account of the number of rails that went from the shop all the time you were there?
1555 A. I did sir, down to the time we moved and went into the other shop.
11. Q. When was that?
A. In May, 1869.
12. Q. Did they cut more or less rails without repairing them otherwise when you first went to that shop, or did they change the amount up to the time you left?
A. Not so many.
13. Q. What proportion of the rails that came into the shop for repairs were, in your judgment, simply cut without being patched, the last year or two of your occupying that shop?
A. It is impossible to tell; I did not keep any memorandum of it at all.
14. Q. What is your best judgment about it?
A. I should judge about three-fourths, if not more.
15. Q. What proportion were cut prior to that time, taking all the balance of the time together.
A. I could not tell that positively.
16. Q. Give us your judgment about it.
A. As near as I can judge, about one-third, perhaps more.

Cross-examination by Mr. Curtis:

1. X Q. Are you quite sure, using your best judgment, that you mended any rail without cutting off?
A. Yes, sir; we mended some of them.
2. X Q. You did mend some few?
A. Yes, sir.
3. X Q. A very few?
A. A few; I don't know how many.
4. X Q. Once in a while you did mend one?
A. Yes, sir.
5. X Q. Not many?
A. I could not tell you how many.
6. X Q. Did you mend many?
1556 A. I could not say how many.
7. X Q. I didn't ask how many, but did you mend many.
A. What do you mean by many? If you will explain what you mean by many, I will answer.
8. X Q. You know what a few is, don't you?
A. Yes, sir.
9. X Q. Many is different from that; now can you answer?
A. Well, I don't understand what that many means. If I can find out what that many means, I will answer.

10. X Q. Very well, if that is the best answer you can give. Will you swear that you ever mended any rails at all?
A. Yes, sir.
11. X. You will swear that you mended one?
A. Yes, sir; more than one.
12. X Q. What was your contract?
A. My contract was two cents an inch.
13. X Q. What did you make a day on that contract?
A. That I could not swear. Sometimes more or less.
14. X Q. What was the most, and what was the least?
A. Two dollars a day, two dollars and a quarter, and one dollar and seventy-five cents sometimes.
15. X Q. What did you pay your blacksmith?
A. I only had helpers. I paid them one dollar and seventy-five cents.
16. X Q. What was the wages you paid?
A. One dollar and seventy-five cents; sometimes one dollar and sixty cents.
17. X Q. Did you furnish coal?
A. They furnished coal—furnished all the material.
18. X Q. You got so much an inch, and they furnished all the material?
A. Yes, sir.
1557 19. X Q. Now, what do you think was the most you made at any time, according to your best judgment?
A. You mean the first year or second year, or what do you mean?
20. X Q. I mean, according to the best of your judgment, what did you make?
A. The most I ever made in one month was about one hundred and twenty-five dollars.
21. X Q. You were paying that rate of wages?
A. I had more men.
22. X Q. How many men did you have, and what did you have, and what did you pay?
A. I believe that in 1867 and 1868 I had seven men. I paid one dollar and sixty cents, and one dollar and seventy-five cents.
23. X Q. How many inches did you make a day to make that profit?
A. I had three fires.
24. X Q. On the three fires, how many inches did you make?
A. I never added them altogether.
25. X Q. You don't know. How many must you have made?
A. I never made that for only one month.
26. X Q. Can't you ascertain?
A. No, sir; the book and papers were burnt up.
27. X Q. If you know what you paid the men, can't you tell what you must have done to make that amount of profit from their labor?

Redirect examination by Mr. Jewett:

17. Q. How long did you work at the business at two cents a foot?
A. That I could not tell you.
1558 18. Q. Was the price changed afterwards?
A. Yes, sir.
19. Q. What were you paid afterwards?
A. Two and a half cents, two and three-quarter cents, and three cents.
20. Q. That was at the time you made the one hundred and twenty-five dollars; what were you getting per inch at the time you quit work?
A. Two and three-quarter cents.

21. Q. How many fires were in operation for rail-repairing at that shop?
A. The better part of the time three, one repairing all the time, the other two going pretty much all the time.
22. Q. Were all these fires run by you on your contract?
A. Yes, sir.
23. Q. This price, two cents an inch, was paid simply for the labor, and the company furnished the material?
A. For the labor; the company furnished the material.
24. Q. Did the company furnish the tools?
A. The company furnished the material to make the tools with.
25. Q. During all this time, did the company furnish all the material?
A. Yes, sir.

By Mr. Curtis:

26. Q. Are you still employed by the Illinois Central Railroad?
A. I am, sir.

F. A. BRIGGS.

1. Q. Please state your name, age, residence, and occupation.
A. F. A. Briggs; age, 26; residence, Cleveland; occupation, clerk in the engineer's office, at the depot of the Michigan Southern Railroad.
1559 2. Q. How long have you been employed in the office?
A. Nearly five years.
3. Q. Do you have charge of the books pertaining to the office?
A. I do at this time; yes, sir.
4. Q. Were you at any time requested to make a summary or statement from the books of the company in your office, in relation to the cost of labor in repairing railroad-iron?
A. I was.
5. Q. Who made that request of you?
A. Mr. Collins.
6. Q. Did you make such a statement or abstract?
A. Yes, sir.
7. Q. Did he assist you in the preparation of it?
A. He did in part; yes, sir.
8. Q. Look at the paper now shown you, marked "Exhibit C," of the deposition of Charles Collins, and state whether it is the paper prepared by you as you have stated?
A. Yes, sir.
9. Q. Are the results set out in this paper such as are shown by the books of the railroad company in your office?
A. They are.
10. Q. Did you yourself go over those books with a view to ascertain the correctness of this exhibit?
A. I did.
11. Q. In the preparation of them?
A. I did.
12. Q. So that you are ready to state that this is the result of the account shown by the books, as set forth in the exhibit?
A. I am.
13. Q. Did you personally do the labor?
A. I did.
14. Q. Where do the books from which this statement was made belong?
1560 A. They belong in the engineer's office, in Cleveland.
15. Q. Are they a part of the records of that office?
A. They are.

16. Q. From your knowledge of the uses to which those books are applied, could they be dispensed with in the office?

(Objected to.)

A. No, sir.

Cross-examination by Mr. Curtis:

1. X Q. Where are the books which show this matter?

A. They are here in Chicago.

2. X Q. Do you know anything, from your own personal knowledge, about the truth of any facts set forth in that paper?

A. I don't know as I understand you. (Question read to witness.) I know that it was taken from our books.

3. X Q. You suppose the paper to be correct?

A. I know it to be correct.

4. X Q. You know that the facts set down in that paper are correct?

A. I do.

5. X Q. Of your own knowledge you know the correctness of the facts?

A. Yes, sir.

6. X Q. You saw the work done?

A. I did the work.

7. X Q. How many rails were repaired in 1866?

A. I could not remember.

8. X Q. How many in 1871?

A. I could not tell.

9. X Q. How many in 1869?

A. I could not tell you.

10. X Q. How many in 1867?

A. I could not tell you.

1561 11. X Q. Do you remember any portion of the contents of that paper?

A. I do not, particularly.

12. X Q. Of your own personal knowledge do you know the truth of the facts set down in this paper?

A. If I understand your question.

13. X Q. Were you yourself aware of the truth of the facts specified in this paper?

A. If you mean by the question what I took it to be, it is.

14. X Q. What was the average number of rails mended?

A. That I could not tell you?

15. X Q. Do you mean to be understood to testify that you personally knew the truth of these facts, or that you simply took the record as you found it?

A. I took the record in the office; I took that from the books.

16. X Q. The books are now in Cleveland?

A. No; in Chicago.

17. X Q. When did they come to Chicago?

A. They came here a week ago last Monday night, I think.

Redirect examination by Mr. Jewett:

17. Q. When you stated, in the cross-examination, that the facts are shown by that paper, you meant simply that the statement was a correct summary from the books of the company?

A. That is what I meant; yes, sir.

18. Q. Did you have anything to do with keeping those books?

A. I did.

19. Q. From what were they made up?

A. Made up from reports sent in by the road-masters, so far as the labor was concerned.

1562 20. Q. How frequently were these reports sent in?
A. Once a month.
21. Q. You know that fact from your own knowledge?
A. I do.
22. Q. Are these books, within your own knowledge, actually made up from these reports?
(Objected to as incompetent.)
A. They were; yes, sir.

L. P. MOREHOUSE.

1. Q. Please state your name, age, residence, and occupation.
A. L. P. Morehouse; age, 38; residence, Chicago; occupation, assistant engineer Illinois Central Railroad.
2. Q. Are you in the office of the chief engineer of the Illinois Central Railroad Company at the present time?
A. Yes, sir.
3. Q. How long have you been connected with the office?
A. Since 1859.
4. Q. Did you prepare for the counsel of the Illinois Central Railroad Company, for use in this case, a statement of the number of rails repaired by that company?
A. I compiled such a statement.
5. Q. From what did you make up this statement?
A. From reports made to the chief engineer by the division engineers who had immediate charge of these rail-shops.
6. Q. Did those gentlemen keep a separate and distinct account of the rails which were simply cut off or mended otherwise than by patching on the top of the rail?
A. The statements were not uniform—some reported separately, and in other shops they would report the number of bars.
1563 7. Q. In making up the statement, was the expense of cutting off rails, without being patched, given?
A. I don't think the expense of cutting off the bars was given.
8. Q. Where the different engineers' reports showed the expense of cutting the bars separate from the general expense of repairing, you did not include the cutting off the bars in the statement so made by you.
A. I did not.
9. Q. Did some, or any considerable number, of these reports, from which you compiled the statement submitted, show the number of rails which were simply cut without being patched?
A. Yes, sir; there were a number that did show the cut rails by themselves.
10. Q. When did the Illinois Central Railroad Company suspend the repairing of rails by means of swaging or hammering?
A. About March, 1869.
11. Q. Were the shops at which rails had been previously repaired closed about that time?
A. Yes, sir.
12. Q. I will ask you if you have made efforts to procure the men who have been engaged in these shops repairing rails?
A. I have endeavored to find the foremen and men who mended the rails.
13. Q. What had become of them?
A. Some of them are here; there is one man whose whereabouts is known, who is in Kansas; all the others, I don't know what has become of them.

14. Q. Have you, or not, tried to find the men who worked at the shops where bars were repaired, (and in other shops on other roads where bars were repaired)?

1564 A. Yes, sir; I have tried to find the men who worked at shops where there was any repairing done.

15. Q. I will ask you if you have recently reviewed the reports of the different engineers, in the office of the chief engineer, from which you made your original statement, for the counsel of the Illinois Central, with the view of ascertaining the number of rails repaired simply by cutting, from those shops, or the workmen in those shops?

A. I have.

16. Q. Have you reviewed your previous statement also, with a view to ascertain the number of rails repaired in some of those shops of Illinois Central Road?

A. Yes, sir.

17. Q. Will you please state the whole number of rails reported as repaired in the shops at Decatur?

(Objected to as incompetent and inadmissable.)

A. The total number reported in Decatur as repaired is ten thousand six hundred and seventy-two, (10,672).

18. Q. What is the number reported as repaired at the Du Quoin shops?

A. Nineteen thousand six hundred and sixty-eight (19,668).

19. Q. What was the number repaired at the Vandalia shops in 1867, 1868, and 1869, as simply those being patched?

A. One thousand two hundred and fifty-two, (1,252.)

20. Q. Did the Illinois Central Railroad have shops for repairing rails at Jonesboro'?

A. Yes; one shop.

21. Q. What number of rails were reported as cut from that shop—cut without being patched—during the years 1867, 1868, and 1669?

A. The shop was only run in 1868 and 1869—eight hundred and eighty-five.

1565 22. Q. What was the number of rails reported as cut in the Centralia shop?

A. At Centralia, in 1868 and 1869, five hundred and forty-three.

23. Q. What was the number reported from the El Paso shops as simply cut?

A. Eight hundred and fifty-nine.

24. Q. What was the number reported as cut at the La Salle shops?

A. Sixteen hundred and sixteen.

25. Q. What was the number reported as cut at the Nora shops?

A. Fourteen hundred and forty-one.

26. Q. What number was reported as cut at the Galena shop?

A. Two hundred and sixty-four.

27. Q. What was the number reported as cut at Dubuque?

A. Twelve hundred and sixteen.

28. Q. Were all of these rails, which you now say were reported as cut rails, included in the statement which you made to the solicitor of the Illinois Central Railroad Company?

A. They were.

29. Q. During what years were rails reported as cut?

A. 1868 and 1869, with the exception of Vandalia; that included 1867 also.

30. Q. Were these rails reported as cut simply in the statement before referred to (of repaired rails) prior to the year 1862?

A. They were previous to 1862.

31. Q. What was the statement of the number of such rails?

(Objected to.)

1566 A. Nine hundred and thirty-five in the year 1861 that were reported as only cut.

32. Q. Were these also included in the statement which you gave to the counsel, which is included in the "answer" in this case, amongst the number of repaired rails?

A. They were.

(It is admitted by counsel for complainant that the statement referred to by the witness Morehouse, as made by him for the counsel of the Illinois Central Railroad Company, was the same which was incorporated into the answer of the Illinois Central Railroad Company in this case, and also that submitted to the master in the accounting.)

On reading over my deposition I find that the answer to direct interrogatory No. 7 is not quite intelligible. I intended to say that the statements from the different shops were not uniform. Some shops reported the cut bars separately, and others made no special report of them, but included them merely as repaired bars.

L. P. MOREHOUSE.

1567 EXHIBIT No. 7.—*Dep. of Wm. Huskinson.—H. W. B.*

One of the exhibits accompanying the deposition of Wm. Huskinson, showing form of the monthly reports.

CHICAGO & ALTON RAILROAD.

Report of rails repaired at Alton repair-shop for the month of May, 1867.

Date of month.	Rails repaired.												Materials used.		
	12 ft.	15 ft.	18 ft.	19 ft.	20 ft.	21 ft.		24 ft.		27 ft.	28 ft.		Iron, lbs.	Steel, lbs.	Coal or coke, lb.
1	....	6	1	....	....	3	....	1	....	....	....	213 rails repaired; number of feet, 4,003.	.....	.....	308
2	....	2	1	....	....	6	....	....	....	....	....		35	.....	286
3	....	....	....	....	....	....	....	....	....	....	....		.....	.....	.....
4	....	10	2	....	....	....	....	....	....	....	....		.....	.....	286
5	....	....	....	....	....	....	....	....	....	....	....		.....	.....	.....
6	....	....	....	....	....	....	....	....	....	....	....		.....	.....	.....
7	....	....	....	....	....	....	....	....	....	....	....		.....	.....	.....
8	....	....	....	....	....	....	....	....	....	....	....		.....	.....	.....
9	....	....	....	....	....	....	....	....	....	....	....		.....	.....	.....
10	....	....	....	....	....	....	....	....	....	....	....		.....	.....	.....
11	....	2	10	....	....	....	....	....	....	....	....		50	.....	286
12	....	....	....	....	....	....	....	....	....	....	....		.....	.....	.....
13	....	3	9	....	....	....	....	....	....	....	....		.....	.....	286
14	....	5	7	....	....	....	....	....	....	....	....		45	.....	308
15	....	6	6	....	....	....	....	....	....	....	....		.....	.....	308
16	....	3	2	....	....	6	....	2	....	....	....		.....	.....	308
17	....	11	3	....	....	3	....	6	....	....	....		30	.....	572
18	....	11	7	....	....	2	....	4	....	....	....		.....	.....	524
19	....	....	....	....	....	....	....	....	....	....	....		.....	.....	.....
20	....	....	3	....	....	6	....	3	....	....	....		36	.....	308
21	....	1	2	....	....	3	....	4	....	....	....		.....	.....	308
22	....	....	8	....	....	2	....	2	....	....	....		.....	.....	308
23	....	4	....	....	....	1	....	....	....	....	2		40	.....	386
24	....	1	....	....	....	....	....	2	....	....	2		.....	.....	154
25	....	6	....	....	....	....	....	....	....	....	....		26	.....	132
26	....	....	....	....	....	....	....	....	....	....	....		.....	.....	.....
27	....	4	4	....	....	....	....	....	....	....	....		.....	.....	286
28	....	4	7	....	....	....	....	....	....	....	....		50	.....	308
29	....	6	4	....	....	....	....	....	....	....	....		40	.....	308
30	....	....	....	....	....	....	....	....	....	....	....		.....	.....	.....
31	....	....	....	....	....	....	....	....	....	....	....		.....	.....	.....
Total	....	85	76	....	....	32	....	24	....	....	4	....	352		209 bu.

Materials received and used during month.

	On hand 1st of month.	Rec'd.	Used.	On hand last of month.	Remarks.
Coal.....lbs..	6,212	.....	2,173	4,039	Used on frogs, 55 feet 4 inches fish-bar iron.
Iron for repairs..... "	5,307	531	844	4,994	
Steel " " ..... "	40	10	41	9	
Rivets .....No..	124½	.....	7	117½	
Borax..... ..lbs..	2	.....	2	.....	
Coke.....bush..	557	378	238	697	
Brick.....	90	.....	.....	90	
Clay.....bbls..	2	.....	.....	2	
Sand.....	1	.....	.....	1	

1568 *Cost of work done on rails and tools.*

	Rails rep'd, 221.	No. of frogs made, 1.	Bridge-work.	Gate-hangers.	No. of switch-rods, 3.	Road tools rep'r'd.	Repairs of hand-cars.	Remarks.
Propor. of pay-roll.....	173-22	45-80	3-50	17-55	10-50	56-55	7-15	
Lbs. of iron used.....	352	15	25	86	127	229	10	
Rivets.....	.....	7	.....	.....	.....	.....	.....	
Lbs. of steel used.....	.....	2	.....	.....	.....	39	.....	
Lbs. of coal used.....	.....	265	106	318	212	1166	106	
Coke, bushels.....	209	29	.....	.....	.....	.....	.....	
Lbs. of borax used.....	.....	¼	.....	.....	.....	1¾	.....	

NOTE.—The total amount of pay-roll for the month is to be apportioned, as near as possible, among the different jobs done, as well as materials used; any explanatory remarks can be written in below here.

1569 *Testimony taken before Henry W. Bishop, esq., master in chancery of the United States circuit court, northern district of Illinois, Monday, January 12, 1874.*

K. F. BOOTH.

Q. 1. What is your name, and have you formerly been examined in this case?

A. K. F. Booth; I have been examined in this case.

Q. 2. Have you recently visited any place on the Chicago & Alton Railroad; if so, what place, and for what purpose?

A. I have recently visited Chenoa, Bloomington, Springfield, and Venice, to measure patched rails during the past week.

Q. 3. Who assisted you in measuring said rails?

A. Mr. Ragland assisted me in making the measurements; it was done in the presence of Mr. Bishop, the master in chancery in said court, to whom this cause had been referred.

Q. 4. Where did you first measure any of said rails?

A. At Chenoa.

Q. 5. Who directed you what portions of the track to go over, with a view of measuring the patched rails there to be found?

A. Mr. Ragland.

Q. 6. Did you follow his directions?

A. I did.

Q. 7. How many rails were measured by you at Chenoa?

A. Twenty-eight.

Q. 8. Was any account kept of the number of rails, and of the length of the patches; if so, by whom?

A. An account of the number of rails and length of the patches was kept by Mr. Bishop, Mr. Ragland, and myself; each of us keeping a separate account in books provided for that purpose.

Q. 9. Have you that account with you?

A. I have.

1570 Q. 10. Will you please state the result of said account or furnish a copy thereof?

A. The following is a copy of said account. The first column indicates the rails we measured; the second column the length of the patches in inches at one end of the rail; the third column the patches in the middle; the fourth column the patches at the other end; the fifth column indicates those patches that, in my opinion, were put on by the Bain's rolls, and the last column those patches that were put on, in my opinion, on the Whitcomb or jaw block.

CHENOA.

Rails.	End.	Middle.	End.	B.	C.
1	8		4		12
2	5				5
3	6				6
4	4				4
5	4		4		8
6	7				7
7	7¼				7¼
8	8				8
9	10		10½		20½
10	7				7
11	8½		5½		14
12	5				5
13	4				4
14	7		14		21
15	8		4½		12½
16	3½				3½
17	6½		14		20½
18		17			17
19	15		6		21
20	6				6
21	9				9
22	10				10
23	10				10
24	13				13
25	5½				5½
26	5				5
27	5½		8		13¾
28	6		5		11

1571 The whole footing up 285¾ inches. Of these rails, the first thirteen and last four only were in the tracks of the Chicago & Alton Railroad; the others were in a part of the track of the Toledo, Peoria & Warsaw Railroad, which connects the main track of that road with the Chicago & Alton Railroad. The total number of inches of mend on the seventeen rails in the Chicago & Alton tracks was 142½ inches, with an average to the rail of 8.4 inches.

Q. 11. Was there any difference in the three accounts kept at Chenoa?

A. After we had compared and corrected, they all three agreed; we didn't compare the footings up.

Q. 12. What was the next point where you measured rails?

A. Bloomington.

Q. 13. Who pointed out these rails to be measured?

A. Mr. Ragland.

Q. 14. Did you keep an account there in the same manner as at Chenoa?

A. I did, and so did the others. The total number of rails measured at this point was 32, with an average of $26\frac{1}{16}$ inches per rail; a copy of the said account so kept by me is here given in the same form as that kept at Chenoa.

1572 BLOOMINGTON.

Rails.	End.	Middle.	End.	B.	C.
1	12			12	
2	12			12	
3	14			14	
4	13				13
5	6				6
6	6½				6½
7	10				10
8	11		4½		15½
9	3½		2½		6
10		20		20	
11		38		38	
12	16½	24 & 19	14	73½	
13		22		22	
14	20			20	
15		24		24	
16	16			16	
17		24		24	
18	13			13	
19	18		12	30	
20		26½		26½	
21	13½	25		38½	
22	11	24		35	
23	27	21		48	
24		22½		22½	
25		27½		27½	
26	12	22 & 21		55	
27	16	26	16½	58½	
28	16	22		38	
29	6				6
30	7½				7½
31	21	21		42½	
32	16	22½	15	53½	

Q. 15. How did you agree with Mr. Ragland at this point?

A. I think we agreed, as the measurements were taken, as to the length of the patches, but we differed as to the manner in which
1573 the patches were put on; in my opinion, all the rails contained in the column headed B were mended on the Bain's rolls. Mr. Ragland said he measured them all before as swage-block patches, and he should so call them now.

Q. 16. Will you state what your present opinion is as to the machine used in putting on those patches, and the reasons for that opinion?

A. My opinion is that all in column marked "C" were put on with swage-block; that all in column marked "B" were put on by Bain's rolls. I have seen a great many rails patched with swage-block, also with Bain's rolls. The difference is very great in the appearance of the rails after being patched in the different machines. I think no one

familiar with rail-patching could mistake one for the other. Rails patched on the Bain's rolls show very plainly a scarf at the end of the patch, while on those mended on the jaw-block the scarf can very seldom be seen. The sides of the patch when put on by Bain's rolls are more clearly defined than when put on by swage-block. When put on by swage-block marks made either by the block or tools can be seen on the neck of the rail. No such marks can be seen when mended by Bain's rolls.

Q. 17. What is the shape of the end of the Bain patch?

A. Some of them have ends nearly square; others have a split end, or diamond-shaped.

Q. 17. In what way do these patches, whether square or diamond-shaped, embrace the rail at the end?

A. The end of the patch is made wider to reach under the head of the rail or on the side of it. They don't always reach clear under the head of the rail. They form a sort of an ear or projection.

Q. 19. How long were these square Bain patches used on the Chicago & Alton?

A. The mill run eight or nine months putting on square ends before commencing to use diamond-shaped patches.

Q. 20. Do you know how the change came to be made?

1574 A. Mr. Bain came to the mill and suggested using diamond-end patches, stating that he thought it made better work, that they were using diamond-ends at the other works. We then, after that, used diamond-ends, although I think not wholly, after that; I am not sure.

Q. 21. Did you have any conversation with Mr. Ragland on that subject; if so, what?

(Objected to as calling for hearsay evidence.)

A. We had conversation while measuring the patches. The first Bain patch which we measured was in Bloomington. I remarked that it was a Bain patch, and should not be measured. He said he measured it before and called it a swage-block patch, because it had a square end. He said he had been informed that they always used diamond patches on the Bain's rolls, and that he supposed that to be the case. He also said he had been in mills and seen diamond patches used by the Bain's machine; and he also said that he never had seen any square patches used with the Bain machine.

Q. 22. What portions of the track did you go over at Bloomington?

A. The portions pointed out by Mr. Ragland as the same portions he measured on before.

Q. 23. He made his own selections, did he?

A. He did as to the portion of the track to be gone over, but I sometimes found a patched rail sooner than he did.

Q. 24. Did any question or difficulty arise as to those portions of the track which you were to go over?

A. I think not at Bloomington.

Q. 25. Will you please state whether it is easy or not to distinguish between the Bain and the jaw-block patches, and what degree of confidence you have as to the measurements made by you at the four places in question?

A. It is very easy to tell the difference with certainty whether a patch is put on by swage-block or Bain's rolls. I am confident that I made no mistakes in distinguishing the two kinds at the four places where we took the measurements.

1575 Q. 26. Did you bring any specimens with you of these various

kinds of patched rails. If so, will you produce them, stating in each instance the kind of patch, and whether any of them were among the rails measured by you and Mr. Ragland?

A. I brought three pieces of rails from Bloomington; the first shows a patch put on with the jaw-block, and is here marked "Exhibit patch 1;" the second shows a patch put on with the Bain's rolls, and having a square end, and is here marked "Exhibit patch 2;" both of these were among the rails we measured, and are both end patches; the third is a middle patch, put on with the Bain's rolls, and showing the diamond-shaped ends above spoken of; it is marked "Exhibit patch 3;" the other three are all jaw-block patches, marked, respectively, "Exhibit patch 4," "Exhibit patch 5," and "Exhibit patch 6." In the last the patch is nearly or quite gone.

Q. 27. Where did you go next?

A. To Springfield.

Q. 28. Did you make similar accounts at Springfield; if so, will you please attach a copy of your account?

A. We did, and I here annex a copy.

SPRINGFIELD.

Rails.	End.	Middle.	End.		C.
1	16½	19	.....	26½	.....
2	16½	.....	.....	16½	.....
3	15½	.....	14½	30	.....
4	.....	26½	13	39½	.....
5	14⅔	22⅔	15	52⅓	.....
6	24	21	12½	57½	.....
7	21	19½	.....	40½	.....
8	18	.....	18	36	.....
9	.....	26	18½	44½	.....
10	11	22	.....	33	.....
11	23	.....	15	38	.....
12	6	.....	21½	27½	.....
13	21½	24	.....	45½	.....
14	15	.....	.....	15	.....
15	22	.....	.....	22	.....
16	14½	.....	.....	14½	.....

1576 Q. 29. Please state in what part of the track these rails were found.

A. They were found north of the Gilman railroad-crossing, in the main track, in the Springfield yard.

Q. 30. Why did you not measure rails in the side tracks?

A. I proposed to measure some in a side track running alongside of the main track, but Mr. Ragland objected, saying that he did not measure any before, except in the main track; I asked Mr. Bishop if we should measure a rail, pointing to a rail in the side track. Mr. Bishop asked if we were to be confined to the same tracks that Mr. Ragland measured in before. I said I supposed so. Mr. Bishop then asked Mr. Ragland if he measured any before in the side track; Mr. Ragland said he only measured in the main track before, and the rail I pointed to in the side track was not measured.

(Objected to so much of the witness' answer as relates to the conversation of Mr. Ragland.)

Q. 31. What kind of a patch was that you offered to measure?

A. A swage-block patch.

Q. 32. Did you see any others of a similar character in the side track?

A. I did.

Q. 33. Were they long or short?

A. I think about the usual length of swage-block patches that we had measured before; I think about six or seven inches.

Q. 34. About how many such patches did you see?

A. I don't remember of noticing more than three or four, as we were not looking for patches in that track.

Q. 35. How often did you suggest to Mr. Ragland or to Mr. Bishop that you should measure patches in the side tracks?

A. I think two or three times before Mr. Ragland stated positively that he did not measure any in the Springfield side tracks before.

(Complainant objects, as before, to testimony in regard to Mr. Ragland's conversation.)

1577 Q. 36. How came you to make that suggestion?

A. Because we had been measuring in side tracks at other places.

Q. 37. Had you seen Mr. Ragland's former testimony in regard to the matter?

A. I had not at that time.

Q. 38. How long were you at Springfield before you began the measuring?

A. We were on the ground about an hour before we commenced taking notes.

Q. 39. Why didn't you begin sooner?

A. Mr. Ragland was comparing the patches on the rails with his memorandum-book.

Q. 40. What book?

A. It was a small memorandum-book, which he said contained his former measurements.

Q. 41. What was said by any one, if anything, to hasten the measurement?

A. After waiting some time, I suggested to Mr. Ragland and Mr. Bishop that we commence taking the notes and measurements; Mr. Bishop said he was ready; Mr. Ragland said he was not ready yet, as he wanted to compare more extensively with his memorandum-book. In relating any of this conversation, of course I can't state the exact words, but the idea which I got from them—the answer.

Q. 42. How did Mr. Ragland occupy that hour before measuring?

A. In measuring patches, and comparing them with his memorandum-book.

Q. 43. What did he say, if anything, about the measurement at Chenoa, in connection with that memorandum-book?

A. He said he did not have the memorandum-book with him the day before at Chenoa.

Q. Please state whether you found any patches about which you at first differed and afterwards agreed; if so, what.

1578 A. We measured one Bain's rolls patch with diamond ends, which Mr. Ragland called a square end swage-block patch, and afterwards admitted it to be a Bain's rolls patch with diamond end. There were two cases I now recall at Springfield, in which we differed and afterward agreed; the other one I called two separate patches with an unpatched space between; Mr. Ragland called it a continuous patch. After we had got through taking notes and Mr. Bishop had left us, I called Mr. Curtis' attention to it, and he agreed with me; Mr. Ragland then said he would change his measurement to agree with mine.

Q. 45. How did you satisfy Mr. Ragland that the first diamond-end patch was a Bain's rolls patch?

A. He examined it more closely after I called it a diamond end.

A. 46. How did he account for your and his measurement at Chenoa differing so widely from his former measurement?

A. He said he did not hold the rule himself at Chenoa, but looked at it as Mr. Lounsbery held it.

Q. 47. Please state whether you found at Springfield, or elsewhere, any mend made up of two or more separate patches?

A. I recollect one case at Bloomington made up of three separate patches put on with Bain's rolls. I think there were other cases, but don't remember the particular ones. The patch referred to at Bloomington was thirty-eight inches long.

Q. 48. How many similar patches did you find that had been done on the jaw-block, if any?

A. I do not remember any on the jaw-block.

Q. 49. What was the next point where you measured rails?

A. Venice.

Q. 50. Did you keep three separate accounts there, similar to those kept at the other places; if so, will you annex a copy of the account kept by yourself?

A. We kept three separate copies, as at the other places. I here furnish the copy kept by myself.

1579 VENICE.

Rails.	End.	Middle.	End.	B.	C.
1	15	24	.....	39	.....
2	.....	27	13	40	.....
3	15½	.....	.....	15½	.....
4	17	.....	.....	17	.....
5	17	.....	20	37	.....
6	15	.....	16	31	.....
7	15	.....	15	30	.....
8	16	.....	17½	33½	.....
9	18	.....	16	34	.....
10	13	.....	19	32	.....
11	15½	.....	17¼	32¾	.....
12	15¼	.....	15½	30¼	.....
13	17½	.....	16¾	34¼	.....
14	18	.....	12	30	.....
15	18½	.....	20	38½	.....
16	6½	.....	.....	.....	6½
17	7	.....	.....	.....	7
18	6½	.....	.....	.....	6½
19	7	.....	.....	.....	7
20	7	.....	.....	.....	7
21	9	.....	.....	.....	9
22	7	.....	.....	.....	7
23	6½	.....	.....	.....	6½
24	6	.....	.....	.....	6
25	7	.....	.....	.....	7
26	20½	.....	12	32½	.....
27	21¾	.....	.....	21¾	.....
28	9½	.....	.....	.....	9½
29	20½	.....	.....	20½	.....
30	15½	.....	21¾	37¼	.....
31	21	.....	16	37	.....
32	13	.....	21	34	.....
33	9½	.....	.....	.....	9½
34	4	.....	.....	.....	4
35	6	.....	.....	.....	6

Making the average length of patch at Venice, by Bain's rolls, 31.3 inches per rail; and the average length of swage-block patches 7 inches per rail.

1580 Q. 51. At these four different places was there any difference in the three several accounts kept by yourself, Mr. Ragland, and Mr. Bishop, except as to the manner in which the patches were put on?

A. I think we agreed in length of patches, and in what rails were patched at each of the four named places.

Q. 52. Please state what you know as to any changes in the track since the first of December, or thereabouts, at these four different places.

A. At Springfield a few rails in main track appeared to have been changed lately; at Venice two or three rails lay alongside where we measured that appeared to have been recently taken out of the track where we were measuring. I saw no indications at other places of changes having been made.

Q. 53. If any considerable number of rails had been taken out of the track at those places, please state whether or not you would have known it.

(Objected to by complainant as incompetent both as to form and substance.)

A. I could tell if rails had been taken out recently.

Q. 54. Please state whether or not you took particular notice of the track at those points or not.

A. I did.

Q. 55. Who has the ordering of the matter when tracks are changed?

A. Ordinary repairs require changing of rails frequently, which the track-men do when they think necessary. I usually give directions where to relay entirely portions of the track, which we don't do except with new rails.

Q. 56. Is there any difference between the main tracks and the side tracks as to the frequency in which changes are made?

A. Changes are made more frequently in the main track than in side tracks where iron rails are used.

1581 Q. 57. Where would you leave a patched rail the longer, in the side track or in the main track?

A. In the side tracks.

Q. 58. After you had got through measuring at those four places, was any offer made to the complainant or complainant's counsel, in your hearing; if so, what?

A. When we were about ready to start from East St. Louis, I heard Mr. Payson offer to go to any other point on the road to measure patched rails that Mr. Curtis or Mr. Turrill would suggest; they declined to designate any point where they wished to measure rails, Mr. Curtis saying he knew no place where patched rails could be found.

Q. 59. State where Exhibits Patches 4, 5, and 6 came from; what part of the road.

A. Exhibits Patch 4, 5, and 6 came from side track at Summit Station.

Q. 60. That is one of the stations on the line of the Chicago & Alton road, is it not?

A. It is.

Q. . Is it one of the original stations, or, if not, when did it fall into the Chicago & Alton road?

A. It is on the Joliet & Chicago Railroad, which is operated and kept in repair by the Chicago & Alton Railroad.

Q. 62. How long has the Joliet & Chicago been so operated?

A. Since the fore part of the year 1864.

Q. 63. How was it before that?

A. It was kept in repair by the Joliet & Chicago Railroad Company before that.

Q. 64. About how long does a patched rail generally wear?

A. There is a very great difference in the time they wear.

Q. 65. Can you state whether these Exhibits 4, 5, and 6 were patched after the Chicago & Alton road began to operate the Joliet & Chicago Road?

1582 A. I cannot tell certainly; I should suppose they probably had been.

Q 66. Please state how the Bain rolls patches, here produced as exhibits, compare with other Bain rolls patches, measured by you at the three several places mentioned.

A. The square end patch Exhibit No. 2 is a fair sample of the Bain's roll patches that we measured. Exhibit Patch No. 3 corresponds with the Bain's roll patches we measured, except the diamond ends.

Q. 67. By whom were these three exhibits, 1, 2, and 3, selected?

A. By Mr. Ragland, Mr. Bishop, and myself.

(Complainant seasonably objects to all questions and answers calling for or giving the conversations of third parties, and to the interrogatories and answers from the 60th to the 65th inclusive, as incompetent, for the reason that they relate to matters not embraced within the order of the court under which this deposition is taken.)

Cross-examination:

X Q. 1. Do you think, Mr. Booth, that you could go over the road again, three weeks hence, and find all the patches, and the same patches, and measure them again, and have them come out just as they did before?

A. I think I could find all the patches if the rails were not removed, and I think the measurements would not be likely to vary much.

X Q. 2. You have spoken of Mr. Bain coming to the rolling-mill and giving advice as to the form of the patches to be put on the rails; did you talk with him personally; if so, when was it, where was it, and who was present?

A. I have seen Mr. Bain, and talked with him personally about patching rails, at the rolling-mill, and in my office; one time, I remember, was in the winter or spring of 1871; he was at the mill; I saw him

1583 there; Mr. Banks, the superintendent of the mill, was present; I don't remember as any one else heard the conversation between us.

X Q. 3. Was that the time when he gave the instructions about the shape of the patch?

A. I don't know whether I was in the mill with him when he gave those instructions; I told Mr. Banks to follow Mr. Bain's instructions about patching.

X Q. 4. Your knowledge on this subject was derived from what other persons told you, was it not?

A. No, sir, not generally.

X Q. 5. You didn't talk any about the matter with James Flavan, who was carried down with you on the special car the other day, did you?

A. Yes, sir; I did.

Q. He had worked in the mill, I believe?

A. He had.

K. F. BOOTH.

1584, 1585 The following testimony, accidentally omitted in books already printed on part of defendants, is respectfully added:

In the circuit court of the United States for the northern district of Illinois.

SAMUEL H. TURRILL
vs.
PITTSBURGH, FORT WAYNE AND CHICAGO Railway Company. } In chancery.

Testimony taken before Henry W. Bishop, master in chancery of said court, Thursday, June 13th, 1872.

Present: The complainant in person; Mr. R. Biddle Roberts, of counsel for the defendants.

THOMAS M. BLAIR, a witness produced on behalf of the defendants being first duly sworn, doth depose and say as follows:

Int. 1. Please state your name, age, residence, and occupation.

Ans. 1. Thomas M. Blair; 35 years; Alleghany City, Penn.; general book-keeper of the Pittsburgh, Fort Wayne and Chicago Railroad Company.

Int. 2. State fully and particularly what knowledge you have of the books of accounts of the company.

Ans. 2. I have full knowledge of the general books of the company, as I keep them, and they are kept in the auditor's office at Pittsburgh, which is the general office of the company.

Int. 2. Please examine the seven books now shown you, (reports of the company,) and state what they are.

Ans. 2. These books, as far as the general books are con-
1586, 1587 cerned, are statements of the doings of the company for the years from January, 1862, to December, 1868, the annual reports.

Int. 3. State whether you have, at the auditor's office at Pittsburgh, any accounts, or books of accounts, from which you can give a statement of the number of rails repaired for the said road by any particular process or patent.

Ans. 3. We have no such books to show such an account.

Int. 4. State whether you know of any such books having been kept since your connection with the road.

Ans. 4. I do not, and think there were no particular books kept for such accounts.

Int. 5. How long have you been the general book-keeper?

Ans. 5. I have been the general book-keeper since July 1st, 1869, and have been in the office for seventeen years in all the departments.

Int. 5. State in what account the repairing of rails would be included in the annual reports.

Ans. 6. Generally in the maintenance-of-way accounts.

Cross-examination by Mr. Turrill:

X Int. 1. Do you have charge of the books kept by the superintendent of the road?

X Ans. 1. No, sir; but his reports from those books come to the auditor, and I enter them in the general books.

X Int. 2. How do you account for some years he gives the amount of rails repaired in his account in the annual reports; for the last few years he does not give any such account?

1588, 1589 X Ans. 2. I cannot account for it in any other way than by the auditor not receiving any charges against the account.

X Int. 3. What do you mean by any charge against the account?

X Ans. 3. Charges for iron rails to the maintenance-of-way department.

X Int. 4. In making up this maintenance of way, as you call it, how is that account kept and made up?

X Ans. 4. It is kept up by the foremen of divisions, and rendered to the superintendent of the respective divisions.

X Int. 5. Doesn't that account show the different items of the nature of the work done that goes to make up that account on the different divisions?

X Ans. 5. I do not know.

X Int. 6. Then, if I understand you, you don't know anything about the accounts outside of those that come into the auditor's office?

X Ans. 6. Not as they specially keep them; when they come into the auditor's office I know what to charge and credit their reports to.

X Int. 7. I see in these accounts of maintenance of ways some of the items, frogs and iron rails as items, and the different amounts purporting to be in dollars in different months. *Is* those amounts for rails repaired or for new iron?

X Ans. 7. I do not know; it may be for both.

X Int. 8. Do you know, of your own knowledge, whether the Pittsburgh, Fort Wayne and Chicago Railroad have ever kept any accounts of repairing railroad-rails?

X Ans. 8. I do not.

1590, 1591 X Int. 9. What time did the Pennsylvania Central Railroad take possession of the Pittsburgh, Fort Wayne & Chicago Railroad under its lease?

X Ans. 9. July 1st, 1869.

X Int. 10. When did William B. Ogden cease to act as receiver for the Pittsburgh, Fort Wayne & Chicago Railroad?

X Ans. 10. I can't answer without evidence from the general office.

X Int. 11. Are the books kept during W. B. Ogden's receivership in the main office at Pittsburg at the present time?

X Ans. 11. I believe they are.

X Int. 12. Do they show the number of rails required during the time he was receiver for the company?

X Ans. 12. The general books do not.

X Int. 13. Do any books kept by the company, or any of its employees, then and since, show the amount of rails repaired?

X Ans. 13. I do not know that any books with that information are in the hands of the company.

X Int. 14. Is not your company in the habit of keeping of books so as to show the expenditures in the different branches for different kinds of work and material furnished?

X Ans. 14. They are; but in some cases very old books, which are simply auxiliaries, are destroyed.

X Int. 15. In what department are maintenance-of-way accounts kept?

X Ans. 15. By the superintendent.

X Int. 16. Would or not, in your opinion, the books of the superintendent kept in his department show the amount of rails repaired on the road in all the different years?

1593, 1594 X Ans. 16. I do not know whether they will show the difference between iron rails and rails repaired.

THOS. M. BLAIR.

Subscribed and sworn to before me this thirteenth day of June, A. D. 1872.

H. W. BISHOP,
Master in Chancery of the Circuit Court of the United States, for the Northern District of Illinois.

The following exceptions, filed in the case of the Pittsburgh, Fort Wayne & Chicago Railway Co., are not common to all the cases, and are therefore printed separately:

First. For that the said master has made the report against the Pittsburg, Fort Wayne & Chicago Railroad Company, which corporation has never been a party to this suit, and no appearance has ever been entered upon their behalf, but the appearance of counsel here has uniformly been for and on behalf of the Pittsburgh, Fort Wayne & Chicago Railway Company; and if the said master, in his report, intends to include the railroad company, and to assess the damages against both corporations in one mass, it is respectfully submitted that he should have distinguished between the older and younger corporations; that the evidence of the dates of the organization of the Pittsburgh, Fort Wayne and Chicago Railway Company were before him in the reports submitted on behalf of the respondents at the examination had before said master.

The other exceptions filed are the same as in the other cases.

R. BIDDLE ROBERTS,
Solicitor for P. F. W. & C. R. W. Co.

1595, 1596 EXHIBIT A, *referred to in the deposition of Daniel L. Harris, being memoranda-book rail-repairing Conn. River R. R. Co., to wit:*

Nov.,	1854.	R. R. iron repaired:	
		435 lbs. iron	19 58
		4,171 " h. coal	18 62
		10 bush. charcoal	80
		23 days, Joel Noble, 8*s*	30 66
		23 " A. Edwards, 6*s*	23 00
		23 " P. Morrisey, "	23 00
			$115 66
		$115 66 cost of repairing:	
		236 rails	
		319 welds on top	
		35 webs repaired	
		(49c per rail.)	
Nov.,	1854.	64 rails repaired for V. V. R. R.	60 00
		3 hour time, rest shop.	
1597, 1598	1855.		
Jan.		Rails repaired:	
		Joel Noble, 26 days, 8*s*	34 67
		Pat. Morrisey, " " 6*s*	26 00
		A. Edwards, " " "	26 00
		Hard coal, 6,500, $8.50	27 62½
		Charcoal, 10 bushel	80
		Iron, 462 lbs., 4½c	20 79
			$135 88½
		Cost 316 rails	
		536 welds on top of rail	

28 webs repaired.....
(43 cents per rail).....

Feb., 1855. Iron repaired—

Joel Noble, 24 days, 8*s*.....	32 00
Pat. Morrisee, 24 days, 6*s*.....	24 00
Alfd. Edwards, " " "	24 00
414 lbs. iron, 4c.....	16 56
7462 lbs. h. coal.....	33 57½
10 bush. charcoal.....	80
	$130 93

345 rails.
567 welds on top of rail.
41 welds on web.
(38 cts. per rail.)

1599, 1600 March.

Mar., 1855. Rails repaired:

Joel Noble, 26 day, 8*s*.....	34 67
Pat. Morrissee, 26, 6*s*.....	26 00
Alfd. Edwards, 25¼, "	25 25
578 lbs. iron, 4½ c	26 01
7,800 lbs. hard coal, $8.50.....	33 15
10 bush. charcoal.....	80
	$145 88

404 rails.
680 welds on top.
46 webs.
(Little over 36 cts. per rail.)

$\frac{7\frac{3}{2}6}{2}$ = 363 ft., 40c..... 145 20

1855.

April. Rails repaired:

"	8½ days, Joel Noble	11 30
"	21½ " Pat. Morrisey.....	21 50
"	7 " A. Edwards.....	7 00
"	13 " Seth. Bliss	21 71
"	14½ " Peter Kelley	16 24
"	360 lbs. iron, 4c	14 40
"	7,500 lb. hard coal, $8.50	31 87½
"	6 bush. charcoal, 8c.....	60
		$124 62

449 rails repaired.
580 welds on top of rail.
39 webs repaired.
(Little over 27 c'ts per rail.)

1601, 1602 1855.

May. Rails repaired:

Joel Noble, 9½d., 8*s*	11 32
Pat'k Morrisey, 9½ d., 6*s*.....	9 50
Alf'd Edwards, 9½ d., 6*d*.....	9 50
174 lbs. iron, 4c	6 96
2,850 lb. hard coal, 8.50	12 12
4 bush. charcoal.....	32
	49 72

181 rails.
280 welds on top.
11 webs.
(About 28 c'ts per rail.)

1855.

June. Rails repaired:

Joel Noble, 4 days, 8*s*	5 32
Pat. Morrisey, 4 days, 7*s*	4 68
J. C. Phelps, 4 days, 7*s*	4 60
67 lb. iron, 4c	2 68
1,200 hard coal, $8.50	5 10
2 bushel charcoal	16
	21 94

63 rails.
103 welds on top.
11 webs.
(About 34 $\frac{8}{10}$ per rail.)

1603, 1604 1855.

July. Rails repaired:

Joel Noble, 5 days, 8*s*	6 67
Pat. Morrisey, 4 days, 6*s*	4 00
Fred. Clarke, 4 " 8*s*. 6*d*	5 67
56 lb. iron, 4c	2 24
1, 500 lbs. hard coal, $8.60	6 37
4 bushels charcoal	32
	25 27

59 rails.
92 welds on top.
11 webs.
(Over 49 c'ts per rail.)

Aug. Rails repaired:

Joel Noble, 1, 8*s*.; Seth Bliss, 8¼ days, $13.78.	15 10
Peter Kelley, 8¼ days, $9.30; A. Edwards, 1, 1.00	10 30
Patrick Morrisey, 9 days	9 00
135 lbs. iron, 4c	5 40
2, 700 hard coal, $8	10 30
2 bushel charcoal	16
	50 26

150 rails.
230 welds on top.
14 webs.
(About 34 c'ts per rail.)

Sept. No rails repaired.

1605, 1606 1855

Oct. Rails repaired:

Peter Kelley, 14 days, 7*s*. 6*d*	17 50
Pat. Morrisey, 14 days, 6*s*	14 00
Thos. Cusic, 14 days, 6*s*	14 00
217 lbs. iron	8 68
8 bushels charcoal	64
259 rails	
422 welds on top of rails	

	20 webs		
	(About 27½ c'ts per rail.)		
	4, 200 lbs. hard coal, $8.00.....	16	80
		71	54

1855.

Nov. Rails repaired:

Peter Kelley, 9 days, 7*s*. 6*d*.....	11	25
Pat. Morrisey, 9 " 6*s*	9	00
Thos. Kusic, 9 " 6*s*	9	00
110 lbs. iron, 4c	4	40
2, 700 lbs. hard coal, 7.50	10	25
2 bushel charcoal.....		32
	44	22

102 rails.
165 welds on top.
15 webs.
(43 ¾ cts. per rail.)

1607, 1608 1855.

Dec. Rails repaired:

Peter Kelley, days, 19¼.....	24	06
Pat. Morrisey, 19¼ days.....	19	25
Thos. Kusic, 19¼ days.....	19	25
380 lbs. iron, 4c.....	14	20
5,700 hard coal, 8.00.....	22	80
4 bushel charcoal, 8.....		32
	99	88

290 rails.
411 welds on top.
25 webs.
(About 34½ cts. per rail.)

1856.

Jan. Rails repaired:

Peter Kelley, 18 days, 7*s*. 6*d*.....	22	50
Pat. Morrisey, " " 6*s*.	18	00
Thos. Kusic " " "	18	00
319 lbs iron 4*s*	12	76
5,400 hard coal, 7.50.....	20	25
8 bushels charcoal, 8c.....		64
	92	15

292 rails.
448 welds on top.
34 webs.
(31. 55 per rail.)

1609, 1610 1856.

Febry. Rails repaired:

E. W. Smith, 19¼ days, 1.75.....	33	69
Pat. Morrisey, 19¼ " 1.00.....	19	25
C. H. Smith, 9¾ " "	9	75
J. Noble, 12 " 1.33.....	15	96
Thos. Kusic, 19¾ "	19	75

181 rails.
280 welds on top.
11 webs.
(About 28 c'ts per rail.)

1855.

June. Rails repaired:

Joel Noble, 4 days, 8*s*	5 32
Pat. Morrisey, 4 days, 7*s*	4 68
J. C. Phelps, 4 days, 7*s*	4 60
67 lb. iron, 4c	2 68
1,200 hard coal, $8.50	5 10
2 bushel charcoal	16
	21 94

63 rails.
103 welds on top.
11 webs.
(About 34 $\frac{8}{10}$ per rail.)

1603, 1604 1855.

July. Rails repaired:

Joel Noble, 5 days, 8*s*	6 67
Pat. Morrisey, 4 days, 6*s*	4 00
Fred. Clarke, 4 " 8*s.* 6*d*	5 67
56 lb. iron, 4c	2 24
1,500 lbs. hard coal, $8.60	6 37
4 bushels charcoal	32
	25 27

59 rails.
92 welds on top.
11 webs.
(Over 49 c'ts per rail.)

Aug. Rails repaired:

Joel Noble, 1, 8*s.*; Seth Bliss, 8 $\frac{1}{4}$ days, $13.78.	15 10
Peter Kelley, 8 $\frac{1}{4}$ days, $9.30; A. Edwards, 1, 1.00	10 30
Patrick Morrisey, 9 days	9 00
135 lbs. iron, 4c	5 40
2,700 hard coal, $8	10 30
2 bushel charcoal	16
	50 26

150 rails.
230 welds on top.
14 webs.
(About 34 c'ts per rail.)

Sept. No rails repaired.

1605, 1606 1855

Oct. Rails repaired:

Peter Kelley, 14 days, 7*s.* 6*d*	17 50
Pat. Morrisey, 14 days, 6*s*	14 00
Thos. Cusic, 14 days, 6*s*	14 00
217 lbs. iron	8 68
8 bushels charcoal	64
259 rails	
422 welds on top of rails	

20 webs .....
(About 27½ c'ts per rail.)
4, 200 lbs. hard coal, $8.00..... 16 80

71 54

1855.
Nov. Rails repaired :
Peter Kelley, 9 days, 7*s*. 6*d*..... 11 25
Pat. Morrisey, 9 " 6*s* 9 00
Thos. Kusic, 9 " 6*s* 9 00
110 lbs. iron, 4c 4 40
2, 700 lbs. hard coal, 7.50 ..... 10 25
2 bushel charcoal..... 32

44 22

102 rails.
165 welds on top.
15 webs.
(43 ½ cts. per rail.)

1607, 1608 1855.
Dec. Rails repaired :
Peter Kelley, days, 19¼..... 24 06
Pat. Morrisey, 19¼ days..... 19 25
Thos. Kusic, 19¼ days..... 19 25
380 lbs. iron, 4c..... 14 20
5,700 hard coal, 8.00..... 22 80
4 bushel charcoal, 8..... 32

99 88

290 rails.
411 welds on top.
25 webs.
(About 34½ cts. per rail.)

1856.
Jan. Rails repaired :
Peter Kelley, 18 days, 7*s*. 6*d*..... 22 50
Pat. Morrisey, " " 6*s*. 18 00
Thos. Kusic " " " 18 00
319 lbs iron 4*s* 12 76
5.400 hard coal, 7.50..... 20 25
8 bushels charcoal, 8c..... 64

92 15

292 rails.
448 welds on top.
34 webs.
(31. 55 per rail.)

1609, 1610 1856.
Febry. Rails repaired :
E. W. Smith, 19¼ days, 1.75..... 33 69
Pat. Morrisey, 19¼ " 1.00..... 19 25
C. H. Smith, 9¾ " " 9 75
J. Noble, 12 " 1.33..... 15 96
Thos. Kusic, 19¾ " 19 75

	M. Handley, 12		12 00
	9,300 lbs. hard coal, 7.50		34 87
	28 bushels charcoal, 8		2 24
	266 rails		
	283 welds on top		
	34 webs		
	(Nearly 66 cts. per rail)		
	698 lbs. iron, 4		27 92
			175 43
1611, 1612	1856. Rails repaired:		
March.	E. W. Smith, 25 days, 11*s*		45 75
	Pat. Morrisey, 26 " 6*s*		26 00
	S. L. Smith, 25 " 6*s*		25 00
	Joel Noble, 23½ " 8*s*		31 25
	Thos. Cusic, 26 " 6*s*		26 00
	Mike Hanley, 26 " 6*s*		26 00
	14,700 lbs hard coal, $8.00		58 80
	12 bushels charcoal		96
	427 rails		
	731 welds on top		
	114 webs		
	(69 cts. each)		
	1,380 lbs. iron, 5c		54 20
			293 96
	1856. Rails repaired:		
April.	Joel Noble, 9½ days, @ 8*s*		12 63
	Thos. Cusic, 18½ days, 6*s*		18 50
	M. Handley, 18½ " 6*s*		18 50
	Pat. Flynne, 12 " 9*s*		18 00
	Dennis Flynne, 12 " 6*s*		12 00
	Pat. Morrisey, 20 " 6*s*		20 00
	E. W. Smith, 2 " 11*s*		3 67
	S. L. Smith, 2 " 6*s*		2 06
	15,000 lbs. hard coal, $8.00		60 00
	773 lbs. iron, 4c		30 92
1613, 1614	8 bushels charcoal		64
			196 86
	308 rails.		
	538 welds on top.		
	164 webs.		
	(63 cts. 9 mills per rail.)		
	1856. Rails repaired:		
May.	Pat. Flynn, 7 days		10 50
	Dennis Flynn, 7 "		7 00
	Jas. Oldes, 7 "		7 00
	2,100 hard coal, 8.00		8 40
	148 lbs. iron, 4c		5 94
	6 bushel charcoal, 8		48
			38 90
	46 rails.		
	88 welds on top.		

23 webs.
($84\frac{56}{100}$ per rail.)

Pat. Morrisey, 27 days, 1.25	33	75
Thos. Cusic, 24 "	27	00
M. Handley, 27 "	27	00
8,100 lbs. hard coal, 8.00	32	40
712 lb. iron	28	48
	148	63

287 rails.
485 welds on top.
105 webs.
($51\frac{78}{100}$ per rail.)

1615, 1616 1856.
June. Rails repaired:

Pat Morrisey $24\frac{1}{2}$ days	30	62
Thos. Cusic, $24\frac{1}{2}$	24	50
Mike Handley, $24\frac{1}{2}$	24	50
7,350 lbs. hard coal, 8.00	29	40
159 lbs. iron @ 4c.	23	64
8 bushel charcoal 8		64
	133	30

269 rails.
446 welds on top.
71 webs.
(About 20 cts. per rail.)

1856.
July. Rails repaired:

Pat Morrisey, 25 days	31	25
Thos. Cusic, 24 "	24	00
Mike Handley, 24 "	24	00
Pat Flynn, $16\frac{1}{2}$ "	24	75
Pat Downing, 19 "	19	00
Denis Flynn, $9\frac{1}{4}$ "	9	25
Pat Heakey, $12\frac{1}{2}$ "	12	50
8265 lbs. coal, 850	35	12
863 lbs. iron, 4 c.	34	52
10 bushel charcoal, 8		80
	215	19

430 rails.
741 welds on top.
81 webs.

1617, 1618 1856.
Aug. Rails repaired:

Pat Morrisey, 14 days	17	50
Thos. Cusic, 12 "	12	00
Mike Handley, 11 "	11	00
Pat Downing, $18\frac{1}{2}$	18	50
Pat Flynn, 19	28	50
Pat Hekey, 15	15	00
7,629 lbs. hard coal 8.50	32	42
583 lbs. iron @ 4c	23	32
24 bushel C. coal, 8	1	92
	160	16

249 rails.
433 welds on top.
62 " webs.
($36\frac{68}{100}$ cts. per end of rail.)

Sept. Rails repaired:

Pat Morrisey, 23 days	28 75
Thos. Cusic, $22\frac{3}{4}$	22 75
M. Handley, $21\frac{3}{4}$	21 75
Pat Flynn, $11\frac{1}{2}$	17 25
Pat Downing, $11\frac{3}{4}$	11 75
Pat Hekey, 1	1 00
James Fitzpatrick	9 50
9,564 lbs. coal @ 8.50	41 07
905 lbs. iron @ 4c	36 00
12 bushel charcoal 8	96
	190 78

1619, 1620.

351 rails.
557 welds on top.
125 webs.

Oct. Rails repaired:

Pat Morrisey, $16\frac{1}{2}$ days	20 63
Thos. Cusic, $16\frac{1}{2}$ "	16 50
Mike Handley, $15\frac{3}{4}$ "	15 75
Pat Flynn, $22\frac{1}{4}$	33 38
Jas. Fritzpatrick, $22\frac{1}{4}$	22 25
Pat Downing, $22\frac{1}{4}$	22 25
9,554 lbs. coal @ 8.50	40 60
820 lbs. iron, @4 c	32 80
14 bushel charcoal	1 12
	205 28

333 rails.
583 welds on top.
112 webs.
(61.64.)

1621, 1622 1856.

Nov. Rails repaired: Nov.

Pat Morrisey, $16\frac{1}{4}$ days	20 31
Thos. Cusic, $16\frac{1}{4}$ "	16 25
Mike Handley, $16\frac{1}{4}$ "	16 25
Pat Flynn, 23 "	34 50
Pat Downing, 23 "	23 00
Jas. Fitzpatrick, 23 "	23 00
7,293 lbs. coal, $8.25	30 08
766 " iron, 4c	30 64
10 bush. charcoal	80
	194 83

302 rails.
580 welds on top.
83 webs.
($64\frac{1}{2}$ cts. per rail.)

1856.
Dec. Rails repaired:

Pat Morrisey, 25¾ days	32	18
Thos. Cusic, 25¾ "	25	75
Mike Handley, 25¾ "	25	75
Pat Flynn, 25¼ "	37	87
Pat Downing, 25¼ "	25	25
James Fitzpatrick, 25¼	25	25
10,990 lbs. coal	45	33
1,161½ lbs. iron, 4c	46	46
16 bush. charcoal	1	28
	265	12

423 rails.
739 welds on top.
109 webs.
(62.67)

1623, 1624 1857.
Jan. Rails repaired:

Pat. Morrisey, 23¾ days	29	69
Thos. Cusic, 22¼ "	22	25
Mike Handley, 22¼ "	22	25
Pat. Flynn, 16¼ "	24	37
Pat. Downing, 18¾ "	18	75
Jas. Fitzpatrick	12	34
9,716 lb. hard coal, $8.50	41	29
816 lb. iron, 4c	32	64
16½ bushels charcoal	1	32
	204	90

307 rails repaired
553 welds on top
71 webs
(66$\frac{96}{100}$ per rail.)

1857.
Feb. Rails repaired:

Pat. Morrisey, 22¼	28	12
Thos. Cusic, 22¼	22	25
Mike Handley, 22¼	22	25
Pat. Flynn, 20¾	31	12
Pat. Downing, 21	21	00
James Fitzpatrick, 18	18	00
Pat. Heakey, 3	3	00
11,657 lb. hard coal, 8.50	49	54
1,284 lb. iron, 4	51	36
28 bushels charcoal	1	44
	248	08

1625, 1626 371 rails.
604 welds on top.
87 webs.
(65$\frac{80}{100}$ per rail.)
388.11 feet top surface.

1857.

March. Rails repaired:

Pat. Morrisey, $23\frac{3}{4}$	29 68
Thos. Cusic, 24	24 00
Mike Handley, 24	24 00
Pat. Flynn, 3	4 50
Pat. Downing, 24	24 00
James Fitzpatrick, 18	18 00
John Hallahan, 12	15 00
11,801 lb. hard coal, $8.50	50 15
1,164 iron, 4	46 56
18 bushels charcoal	1 80
	237 69

$359\frac{1}{2}$ rails.
547 welds on top.
97 webs.
($66\frac{20}{100}$.)
266.2, length of patches.

Jones	62 rails.
Egan	75
Duress	52
Loomis	75
Phelips	38
	302

1627, 1628 1857.
April.

Pat. Morrisey, $23\frac{3}{4}$	29 68
Thos. Cusic, 25	24 00
Mike Handley, 24	24 00
John Hallahan, 24	32 00
Pat. Heaky, 24	24 00
Pat. Downing, 24	24 00
10,388 lbs. hard coal, $8.50	44 15
1,292 lbs. iron, 4c	51 68
12 bushels charcoal	96
	254 47

365 rails.
588 welds on top.
95 webs.
419 feet to surface.
($69\frac{99}{100}$ per rail.)

Jones	125 rails.
Egan	100
Loomis	56
Duress	85
Philips	21

1629, 1630 1857.
May. Rails repaired:

Pat. Morrisey, $20\frac{1}{2}$	25 63
Thos. Cusic, $20\frac{1}{2}$	20 50
Mike Handley, $20\frac{1}{2}$	20 50
John Hallahan, $22\frac{1}{2}$	29 87
Pat. Heaky, $22\frac{1}{2}$	22 50
Pat. Downing, $22\frac{1}{2}$	22 50

7,185 lbs. hard coal, $8.50		30 54
967 lbs. iron, 4c		38 68
17 bushels charcoal, 8c		1 36
		212 08

287 rails.
464 welds on top.
79 webs.
339.3 feet in length.
(Nearly 74 cts. per rail.)

Jones	21
Loomis	66
Eagan	35
Duress	31

1631, 1632 1857.
June. Rails repaired:

Pat. Morrisey, 20¼	25 31¼
Jas. Fitzpatrick, 20¼	20 25
Thos. Cusic, 20¼	20 25
John Hallahan, 21½	26 60
Pat. Heaky, 21½	21 50
Pat. Downing, 21½	21 50
9,738 lbs. hard coal, $8.50	31 38
1,212 lbs. iron, 4c	48 48
18 bushel charcoal, 8c	1 44
	223 74

420 rails.
651 welds on top.
125 webs.
502′ 4″ feet in length.
(54½ cts. per rail.)

1857.
July. Rails repaired:

Pat. Morrisey, 26¼	32 81
Pat. Hickey, 26	26 00
Thos. Cusic, 26	26 00
John Hallahan, 11	14 63
Pat. Downing, 11	11 00
Others, 11	11 00
8,158 lbs. coal, 8.00	32 63
965 lbs. iron, 4c	34 60
1633, 1634 23 bushel charcoal, 8	1 92
	190 59

348 rails.
551 welds on top.
56 webs.
374′ 9″ patches.
(54$\frac{76}{100}$ per rail.)

1857.
Aug. Rails repaired:

Pat. Morrisey, 18 days	22 50
Thos. Cusic, 18 "	18 00
Pat. Hicky, 18 "	18 00
John Hallahan, 13 "	17 29

	James Canegan, 13 "		15 21
	Pat. Downing, 13 "		13 00
	9,892 lbs. coal, $8.00		39 56
	1,017 lbs. iron, 4c		40 68
	22 bushel charcoal, 8		1 76
			186 00

386 rails.
588 welds on top.
63 webs.
415 f. 4½ in. of patches.

1635, 1636 1857.
Sept. Rails repaired:

Pat. Morrisey, 17 days		25 25
Thos. Cusic, 17 "		17 00
Pat. Hickey, 17 "		17 00
John Halahan, 14½ "		19 28
Jas. Cernegan, 14½ "		16 96
Pat. Downing, 14½ "		14 50
9,864 lbs. coal, 8.00		39 45
1,013 lbs. iron, 4c		40 52
26 bushels C. coal, 8		2 08
		188 04

405 rails.
620 top repaired.
35 webs "
405 f. 4 in. of patches.

1857.
Oct. Rails repaired:

18 days, Pat. Morrisey		22 50
18 " Thos. Kusic		18 00
18 " Pat. Hickey		18 00
24 " John Hallahan		31 92
24 " James Kerrigen		28 08
24 " Pat. Downing		24 00
13,605 lbs. coal, $8		54 42
1,470 lbs. iron, 4c		58 80
36 bushel charcoal		2 08
		257 80

1637, 1638
472 rails.
729 welds.
58 webs.
549 feet of patches.
($54\frac{62}{100}$ per rail.)

1857.
Nov. Rails repaired:

9½ days, Pat. Morrisey		10 83
8¾ " Thos. Cusic		7 87½
8¾ " Pat. Hickey		7 87½
14¼ " John Hallahan		17 81
15¼ " Pat. Downing		13 72
14¼ " James Carrigen		14 14
7,370 lbs. coal, $8.00		29 48
830 lbs. iron, 4c		33 20

		16 bushel charcoal, 8	1 28
			136 27
		205 rails.	
		359 welds.	
		42 webs.	
		293 ft. 3 in. of patches.	
1639,1640	1857.		
	Dec.	Rails repaired:	
		23½ Pat. Morrisey	27 50
		23½ Thos. Cusic	21 15
		23½ Pat. Hickey	21 15
		25 John Hallahan	31 25
		25 Pat. Downing	22 50
		25 James Carrigen	25 00
		14,839 lbs. coal, $8.00	59 35
		1,655 lbs. iron, 4c.	66 20
		24 bushel charcoal, 8c.	1 92
			276 02
		480 rails.	
		767 welds.	
		87 webs.	
		597 feet 10 in. patches on top.	
		(About 58 cts. each rail.)	
		Delivered Philips 68 rails.	
		Jones 45 "	
		Egan 46 "	
		Cook 133 "	
		Duress 56 "	
1641,1642	1858.		
	January.	Rails repaired:	
		24½ days Pat. Morrisey	28 66
		24½ " Thos. Cusic	22 05
		24½ " Pat. Hickey	22 05
		19¾ " John Hallahan	24 06
		19¾ " James Carrigen	19 75
		19¾ " Pat. Downing	17 78
		13,883 lbs. coal, $8	55 53
		1,637 iron, 4c.	65 48
		18 bushel charcoal, 10	1 80
			257 16
		474 rails.	
		759 welds on top.	
		85 webs.	
		558½ feet pieces on top.	
		(About 46 cts. per foot.)	
		Philips 26	
		Jones 123	
		Cook 144	
		Egan 116	
		Duress 70	
			479

1643, 1644 1858.

Feb. Rails repaired:

$20\frac{3}{4}$ days, Pat. Morrisey		24 28
$20\frac{3}{4}$ " Thos. Cusic		18 68
$20\frac{3}{4}$ " Pat. Hickey		18 68
$19\frac{1}{4}$ " John Hallahan		24 06
$19\frac{1}{4}$ " Pat. Downing		17 33
$18\frac{3}{4}$ " Jas. Carregen		18 75
12,821 lbs. coal, $8		51 28
1,577 lbs. iron, 4c.		03 08
14 bushel charcoal, 10c.		1 40
		237 54

414 rails.
705 welds on top.
83 webs.
$557\frac{4}{1\frac{1}{2}}$ feet patches.
$33\frac{69}{100}$ each end repaired.
$57\frac{37}{100}$ each rail.
(About $42\frac{5}{8}$ cts. per foot.)

Phillips	49
Jones	102
Cook	200
Egan	51
Duress	41
	443

1645, 1646 1858.

March. Rails repaired:

25 Pat. Morrisey		29 25
25 Thos. Cusic		22 50
$22\frac{1}{2}$ Pat. Hickey		22 50
22 John Hallahan		27 50
$22\frac{1}{4}$ Pat. Downing		20 03
11 Jas. Carregen		11 00
7 Wm. Daley		7 00
$3\frac{1}{4}$ Thos. Degnen		2 93
18,051 lbs. coal, $8.00		72 20
2,207 lbs. iron, 4c.		88 28
16 bushel charcoal, 8		1 28
		304 47

541 rails.
889 tops repaired.
113 webs.
$759\frac{7}{1\frac{1}{2}}$ feet patches.
($34\frac{1}{2}$ cts. an end; about 40 cts. per foot.)

Philips	36
Jones	142
Cook	193
Egan	66
Duress	93
	530

1647, 1648 1858.
April. Rails repaired:

14, Pat. Morrisey	16	38
15, Thos. Cusic	13	50
14, Pat. Hickey	12	60
16¾, John Hallahan	20	93
17½, Pat. Downing	15	75
17½, Thos. Dignal	15	75
11,847 lbs. coal, $8	47	39
1,378 lbs. iron	55	12
10 bushel charcoal	1	00
	198	42

353 rails.
565 tops repaired.
63 webs.
464 feet.
19, Phillips.
79, Jones.
122, Cook.
63, Egan.
89, Duress.

1649, 1650 1858.
May. Rails repaired:

3¼, Pat. Morrisey	3	80
3¼, Thos. Cusic	2	93
6, Pat. Hickey	5	40
7¾, John Hallahan	9	59
7¾, Pat. Downing	6	53
5, Thos. Dignal	4	50
4,096 lbs. coal, 8.50	17	40
488 lbs. iron, 4c	19	52
6 bushel charcoal		60
	70	27

129 rails.
229 tops.
27 webs.
177½ feet.
($54\frac{47}{100}$ per rail.)

Philips	4
H. W. Jones	1
J. Cook	93
J. Egan	21

1651, 1652 1858. Rails repaired:
June.

2½, Pat. Morrisey	2	94
16¾, John Hallahan	20	94
14¾, Pat. Hickey	13	25
15½, Pat. Downing	13	73
6,307 lbs. coal, $8½	26	80
669 lbs. iron, @ 4c	26	76
12 bushel charcoal, 10c	1	20
	105	62

235 rails.
41 webs.

338 welds on top.
247¼ feet.
(44.94 per rail.)

Philips	46
Jones	84
Cook	64
Duress	35
Ash. R. R	61

1653, 1654 1858.
July. Rails repaired:

¾, Pat. Morrisey	75
17¾, John Hallahan	22 18
17½, Pat. Hickey	15 75
17¾, Pat. Downing	15 98
6,033 lbs. coal, $8.00	24 13
569 iron, 4	22 76
10 bushel charcoal	1 00
	$102 55

272 rails.
349 tops repaired.
32 webs.
238 5/12 feet.

Philips	22
Jones	224
Egan	26

1858.
Aug. Rails repaired:

15, John Hallahan	18 75
15, Pat. Hickey	13 50
15, Pat. Downing	13 50
5,254 lbs. coal, $8.50	22 32
455 lbs. iron, 4c	18 20
1655, 1656 10 bushel charcoal	1 00
	87 27

204 rails.
264 tops repaired.
33 webs "
184¼ feet.

Jones	162
Egan	26
Philips	16

1858.
Sept. Rails repaired:

7, John Hallahan	9 31
7, Pat. Hickey	6 30
7, Pat. Downing	6 30
1,671 lbs. coal, 8½	7 10
155 lbs. iron, 4	6 20
4 bushel charcoal	40
	35 61

74 rails.
91 tops repaired.
32 webs.

$74\frac{1}{3}$ feet.

Duress	19
Egan	21
Cook	12
Jones	22

1657, 1658 1858.

Oct. Rails repaired:

5,435 lbs. coal, $8		21 79
473 lbs. iron, @ 4c		18 92
15 bushel charcoal		1 50
195 rails.		
271 welds on top.		
46 webs.		
$194\frac{8}{12}$ feet.		
Labor		65 79
		108 00

Duress	66
Egan	34
Cook	55
Jones	40

1858.

Nov. Rails repaired:

7,908 lbs. coal, $8	31 63
733 lbs. iron, 4c.	22 32
20 bush. charcoal, 10c	2 00

1659, 1660

287 rails.
437 ends repaired.
54 webs "
301 7-12 feet.

Labor	30 05
	86 00

Cook	156 rails.
Duress	31 "
Philips	52
Egan	48

1858.

Dec. Rails repaired:

9,713 lbs. coal, $8.00	38 85
756 lbs. iron, 4c	30 24
20 bushel charcoal	2 00
342 rails.	
468 ends repaired.	
96 webs.	
$302\frac{1}{3}$ feet.	
Labor	42 40
	103 49

Egan	82
Jones	96
Duress	114
Philips	24
Cook	26

1661, 1662 1859.

Jan. Rails repaired:

20¾, J. Hallahan, 8*s*	27 67
20¾, Pat. Hickey, 6*s*	20 75
20¾, Pat. Downing, .90	18 67
	67 09
10,648 lbs. coal, 7	37 26
982 lbs. iron, @ 3c	29 46
20 bushel charcoal, 10c	2 00
	135 81

313 rails.
577 tops repaired.
85 webs.
359⅓ feet.

Ashuelot R. R.	10
Jones	103
Philips	71
Cook	27
Egan	82
Duress	20
	313

1859. Two fires:

Feb. Rails repaired:

21, J. Hallahan, 8*s*	28 00
42, for helpers, 6*s*	42 00
22½, Pat Morrisey, 7*s*. 6*d*	28 12
45, for 2 helpers, 6*s*	45 00
	143 12

1663, 1664

16,228 lbs. coal, $7	56 79
1,701 lbs. iron, 3c	51 03
20 bush. charcoal, 10c	2 00
	252 94

452 rails.
656 tops repaired.
150 webs.
496 feet.

Jones	161
Cook	75
Duress	84
Philips	52
Egan	71

1859.

March. Rails repaired:

18¾, J. Hallahan, 8	25 78
37½, for helpers, 6*s*	37 50
6½, Pat Morrisey, 7*s*. 6*d*	8 12
13, for helpers, 6*s*	13
	84 40
8,831 lbs. coal, $7	31 90

	920 lbs. iron, 3c		27 60
	20 bushel charcoal, 10c		2 00
			145 90

1665, 1666

264 rails.
403 tops repaired.
107 webs.
303 $\frac{8}{12}$ feet.

Philips	49
Jones	63
Cook	33
Egan.	22
Duress	95
Ash. R. R	2
	264

1859.
April.

Rails repaired:

18$\frac{1}{4}$, J. Hallahan, 8*s*		24 33
36$\frac{1}{2}$, for helpers		36 50
		60 83
7,483 lbs. coal, $7		26 19
743 lbs. iron @ 3c		22 29
20 bushel charcoal, 10		2 00
		111 31

261 rails repaired.
376 tops repaired.
88 webs "
265 feet.

Philips	20
Jones	2
Cook	111
Egan	16
Duress	105
Ash. R. R.	7
	261

1667, 1668 1859.
May, Rails repaired.

13$\frac{3}{4}$, J. Hallahan, 8*s*.		18 33
27$\frac{1}{2}$, helpers.		27 50
2, Pat. Morrisey, 7*s*. 6*d*.		2 50
4, for helpers.		4 00
		52 33
5,250 lbs. coal, $7		18 37
563 lbs. iron, 3c		16 89
10 bushel charcoal, 10c		1 00
		88 59

181 rails repaired.

236 welds on top.
64 webs.
175 feet.

Philips	50
Jones	27
Bennet	33
Duress	71
	181

1669, 1670 1859.
June. Rails repaired:

16½, J. Hallahan, 8s	22 00
33, for helpers	33
6,413 lbs. coal, $7	22 44
621 lbs. iron, 3c	18 63
12 bush. charcoal	1 20
	99 27

204 rails.
295 tops repaired.
81 webs.
207⅓ feet.

Philips	38
Jones	6
Bennett	27
Egan	22
Duress	111
	204

1859.
July. Rails repaired.

14¾, J. Hallahan, 8s	19 67
29½, for helpers	29 50
5,840 lbs. coal, $7	20 44
578 lbs. iron, 3c	17 34
8 bushel charcoal, 10c	80
	87 75

1671, 1672 186 rails.
288 tops repaired.
72 webs.
196 8/12 feet.

Philips	33
Bennett	49
Egan	9
Duress	95
	186

1859.
Aug. Rails repaired:

19¼, J. Hallahan 8s	25 67
38½, for helpers	38 50
7,833 lbs. coal, 7	27 41
835 lbs. iron, 3c	25 05
12 bushel charcoal	1 20
	117 83

273 rails.
393 tops repaired.
91 webs repaired.
276 feet.

Philips	54
Jones	8
Bennett	45
Egan	46
Duress	120
	273

1673, 1674 1859.
Sept. Rails repaired:

Pat. Morrisey, 23 days 1.25	28 75
Pat. Hickey, 23 " 6*s*	23 00
Pat. Downing, 23 " 90	20 70
7,403 lbs. coal, $7.50	27 76
704 lbs. iron, 4c	28 16
12 bushel charcoal, 10c	1 20
	129 57

283 rails.
385 tops repaired.
62 webs "
247 feet.
(45.78 per rail.)

Philips	27
Jones	55
Bennett	113
Egan	51
Duress	37

1859.
Oct. Rails repaired:

23, Pat. Morrisey, 7*s*. 6*d*	28 75
46 for helpers, 6*s*	46 00
7,904 hard coal, $7	27 66
710 lb. iron, 3	21 30
1675, 1676 10 bushel charcoal	1 00
	124 71

326 rails.
412 tops repaired.
73 webs "
262 $\frac{5}{12}$ feet

Jones	150
Philips	19
Bennet	36
Egan	41
Duress	80

1859.
Nov. Rails repaired:

21 $\frac{1}{4}$, Pat .Morrisey, 7*s*. 6*d*	26 56
42 $\frac{1}{2}$ for helpers, 6*s*	42 50
7,295 lbs. coal, $7	25 53
630 " iron, 3c	18 90

	5 bushel charcoal, 10		50
			113 99
	316 rails.		
	363 tops repaired.		
	53 webs "		
	225½ feet.		
1677, 1678	Jones	92	
	Bennet	32	
	Egan	54	
	Duress	138	
1859.			
Dec.	Rails repaired:		
	26, Pat. Morrisey, 7*s.* 6*d*		32 50
	52, For helpers, 6*s*		52 00
			84 50
	9,509 lb. coal, $7		33 28
	906 lb. iron, 3		27 18
	10 bushel charcoal, 10		1 00
			145 96
	373 rails.		
	497 tops repaired.		
	101 webs "		
	326¼ feet.		
	Philips	32	
	Jones	47	
	Bennet	130	
	Egan	42	
	Duress	121	
1679, 1680	1860.		
	Jan. Rails repaired:		
	24¼, Pat. Downing		30 62
	49, for helpers		49 00
	9,456 lb. coal, $7		33 10
	882 " iron, 3c		26 46
	10 bushel charcoal, 10c		1 00
			140 18
	347 rails.		
	472 tops repaired.		
	148 webs "		
	311½ feet.		
	Philips	20	
	Jones	101	
	Bennet	67	
	Egan	71	
	Duress	88	
1860.			
February.	24¾, Pat. Downing, 7*s.* 6*d*		30 94
	49½, for helpers, 6*s*		49 50
	9,678 lb. coal, $7		33 87
	968 lb. iron, 3		29 04
	6 bushel charcoal		60
			143 95

1681, 1682 398 rails.
524 tops repaired.
118 webs "
346½ feet

Philips	30
Jones	157
Bennet	59
Egan	53
Duress	98

1860.
March. Rails repaired:

21, Pat. Morrisey	26	25
42, for helpers	42	00
8,273 lb. coal, $7	28	95
740 lb. iron, 3	21	20
6 bush. charcoal		60
	119	00

308 rails.
431 tops repaired.
97 webs.
281½ feet.

Philips	41
Jones	50
Bennet	48
Egan	54
Duress	115
	308

1683, 1684 1860
April. Rails repaired:

13½, Pat Morrisey	16	87
27, for helpers	27	00
4,894 lb. coal, $7	17	12
392 " iron, 3	11	76
3 bushel 10c		30
	73	05

185 rails.
240 welds on top.
32 webs.

Bennet	43
Jones	5
Egan	39
Duress	98
	185

149 feet.

1860
May. Rails repaired:

6, Pat. Morrisey	7	50
12, for helpers	12	
2,005 lb. coal, $7	7	03
199 " iron, 3	3	97
2 bushel charcoal		20
	30	70

1685, 1686 78 rails.
108 tops.
28 webs.
75 feet.

Philips	21
Jones	9
Duress	48

1860.
June. Rails repaired:

7, Pat Morrisey	8 75
14, for helpers	14 00
2,332 lb. coal, $7	8 16
257 lb. iron, 3c	7 71
	38 62

95 rails.
133 tops repaired.
22 webs "
$89\frac{2}{12}$ feet "

Philips	36
Bennet	45
Duress	12
	93

1687, 1688 1860.
July. Rails repaired:

$19\frac{1}{2}$, Pat. Morrisey	24 36
37, for helpers	37 00
6,986 lb. coal, $7	24 45
679 " iron, 3c	20 37
4 bushel charcoal	40
	106 59

289 rails.
394 tops repaired.
74 webs "
246 feet "

Philips	22
Jones	76
Bennett	112
Egan	50
Duress	29
	289

1860
Aug. Rails repaired:

26, Pat. Morrisey	32 50
52, for helpers	52
9,190 lb. coal, $7	32 16
870 " iron, 3c	25 10
6 bushel charcoal	60
	142 36

1689, 1690 368 rails.
514 tops repaired.

76 webs "
318½ feet.

Philips	43
Jones	73
Bennett	114
Egan	103
Duress	35
	368

1860
Sept. Rails repaired:

22⅜, Pat. Morrisey	29	69
45½, for helpers	45	50
8,969 lb. coal, $7	31	39
790 " iron, 3c	23	70
5 bushel charcoal		50
	130	78

360 rails.
491 tops repaired.
101 webs.
285 feet.

Philips	20
Bennett	48
Jones	233
Egan	32
Duress	27
	360

1691, 1692 1860.
Oct. Rails repaired:

23, Pat. Morrisey	28	75
46, for helpers	46	00
8,334 lb. coal, $7	29	16
700 iron, 3c	21	60
5 bushel charcoal		40
	125	31

300 rails.
429 tops repaired.
91 webs "
254⅓ feet.

Philips	49
Jones	64
Bennett	40
Egan	47
Duress	100
	300

1860
Nov. Rails repaired:

21½, Pat. Morrisey	26	87
43, for helpers	43	00
7,778 lb. coal, $7	27	22
703 lb. iron, 3c	21	09

	4 bushel charcoal		40
			118 58
1693, 1694	307 rails.		
	441 tops repaired.		
	75 webs.		
	263 feet.		
	Philips	59	
	Jones	120	
	Bennett	16	
	Egan	25	
	Duress	87	
		307	
1860			
Dec.	Rails repaired:		
	24, Pat. Morrisey		30 00
	48, for helpers		48
	9.000 lb. coal, $7.25		31 50
	755 lb. iron, 3		22 65
	4 bushel charcoal		40
			132 55
	336 rails.		
	468 tops repaired.		
	53 webs "		
	276¾ feet.		
	Bennett	59	
	Jones	93	
	Philips	70	
	Egan	50	
	Duress	64	
		336	
1695, 1696	1861.		
	Jan. Rails repaired:		
	17¼, Pat. Morrisey		20 12
	34½, for helpers		34 50
	6,605 lb. coal, 7		23 11
	567 lb. iron		17 01
	3 bushel charcoal		30
			95 04
	236 rails.		
	359 tops repaired.		
	48 webs "		
	211¼ feet.		
	Philips	37	
	Jones	42	
	Bennett	23	
	Egan	55	
	Duress	79	
1861.			
Feb.	17, Pat. Morrisey		21 25
	34, for helpers		34
	6,882 lb. coal, $7		24 08

596 lb. iron, 3c			17 88
3 bushel charcoal			30
			97 51

1697, 1698 270 rails.
381 tops repaired.
44 webs "
224 5/12 feet.

Philips	25
Jones	52
Bennett	44
Eagan	62
Duress	87
	270

1861.
March. Rails repaired:

23½, Pat. Morrisey		29 37
47, for helpers		47 00
9,099 lb. coal, 7		31 84
790 bl. iron, 3¼		23 70
4 bush. coal, 10c		40
		112 31

347 rails.
460 welds on top.
71 webs.
270 feet.

Philips	65
Jones	61
Bennett	94
Eagan	75
Duress	52
	347

1699, 1700 1861.
April. Rails repaired:

17, Pat. Morrisey		21 25
34, for helpers		34
255 rails.		
6,832 lb. coal, $7		23 91
579 lbs. iron, 3¼c		17 67
4 bushel charcoal, 10c		40
		97 23

255 rails.
367 tops repaired.
106 webs.
204⅛ feet.

Philips	21
Jones	47
Egan	52
Duress	135
	255

1861.
May. Rails repaired:

26¼, Pat. Morrisey	32 82
52½, for helpers	52 50
9,558 lb. coal, $7	33 95
837 lb. iron, 3	25 11
	144 38

1701, 1702 399 rails.
551 tops repaired.
112 webs "
303 7/12 feet.

Philips	37
Jones	128
Egan	110
Duress	62
Burke	62
	399

1861.
June. Rails repaired:

23¼, Pat. Morrisey	29 06
46½, for helpers	46 50
8,915 lb. coal, 7	31 20
747 lb. iron, 3	22 41
4 bushel charcoal	40
	129 57

338 rails.
488 tops repaired.
113 webs.
274 11/12 feet.

Bennett	80
Jones	122
Cushman	33
Egan	21
Duress	40
Burke	42
	338

1703, 1704 1861.
July. Rails repaired:

24, Pat. Morrisey	30 00
48, for helpers	48 00
9,057 lb. coal, $7	31 69
815 lb. iron, 3	24 45
5 bushel charcoal, 10c	50
	134 64

336 rails.
522 tops repaired.
122 webs.
280½ feet.

Bennett	87
Jones	60
Cushing	31

	Egan	21	
	Duress	36	
	Burke	101	
		336	
1861.			
Aug.	Rails repaired:		
	9½, Pat. Morrisey		11 87
	19, for helpers		19
	3,102 lb. coal, $7		10 87
	279 lb. iron, 3		8 37
			50 11
1705, 1706	130 rails.		
	186 tops repaired.		
	24 webs.		
	104 9/12 ft.		
	Bennett	42	
	Jones	28	
	Burke	60	
1861.			
Sept.	Rails repaired:		
	17, Pat. Morrisey		21 25
	34, for helpers		34
	5,379 lb. coal, $7		18 82
	489 iron, 3		14 67
			88 74
	192 rails repaired.		
	276 tops "		
	42 webs.		
	154½ feet.		
	Bennett	34	
	Jones	20	
	Cushing	13	
	Egan	19	
	Duress	65	
	Burke	41	
		192	
1707, 1708	1861.		
	Oct. Rails repaired:		
	27, Pat. Morrisey		33 75
	54, for helpers		54 00
	8,516 lb. coal, $7		29 80
	768 lb. iron, 3		23 04
			140 59
	282 rails.		
	440 tops repaired.		
	90 webs "		
	246 feet.		
	Bennett	46	
	Cushing	39	
	Egan	93	
	Duress	63	

	Burke	41	
		282	

1861.
Nov. Rails repaired:

23, Pat. Morrisey		28 75
46, for helpers		46
8,331 lb. coal, 7		29 15
764 lb. iron, 3		22 92
		126 82

327 rails.
458 tops repaired.
57 webs "
1709, 1710 $238\frac{3}{12}$ feet.

Bennett	122
Jones	124
Cushing	31
Duress	50
	327

1861.
Dec. Rails repaired:

25 Pat. Morrisey		31 25
25 Tom Maime		25 00
25 Pat. Downing		22 50
7,918 lb. coal	$7	27 71
689 lb. iron	3 c.	20 67
		127 13

323 rails.
483 tops.
68 webs.
$256\frac{10}{12}$ feet.

Cost per rail	39.3
" " end	26.3
" " foot	49.4

Bennett	83
Jones	40
Cushing	63
Egan	73
Burke	64
	323

1711, 1712 EXHIBIT B, *referred to in the deposition of Daniel L. Harris, being memoranda-book rail-repairing Conn. River R. R. Co., to wit:*

1862.
Jan. Rails rep'd:

23 days, Pat. Morrisey		28 75
23 " Tom Mannix		23 00
23 " Pat. Downing		20 70
7,443 lb. coal	$7	26 05

635 lb. iron ..... 3 c. 19 05

117 55

290 rails.
435 tops.
81 webs.
224 7/12 feet.
Jones 123
Cushing 77
Duress 46
Burke 44
40.5 per rail.
27 " end.
52.3 " foot.

1713, 1714 1862.
Feb. Rails repaired:
17½ Pat. Morrisey 21 87
17½ Tom Manix 17 50
17½ Pat. Downing 15 75
6,232 lb. coal 7 21 81
542 lb. iron 3 16 26

93 19

226 rails.
347 tops repaired.
42 webs.
185½ feet.
(41.2 per rail; 26.8 per end; 50 per foot.)

1862.
March. Rails repaired:
Days 26. Pat. Morrisey 32 50
" 26. Tom Manix 26 00
" 26. Pat. Downing 23 40
8,940 lb. coal $7 31 29
778 lb. iron ..... 3 c. 23 34

136 53

332 rails.
483 tops.
110 webs.
256½ feet.
Bennett 105
Jones 100
1715, 1716 Cushing 55
Egan 21
Duress 35
Burke 16

332

1862.
April. Rails repaired:
17½ Pat. Morrisey 21 87
17½ Tom Manix 17 50
17½ Pat. Downing 15 75
5,595 lb. coal 17 58

495 lb. iron 14 85

87 55

207 rails.
307 tops repaired.
62 webs.
155½ feet.

Jones	108
Cushing	23
Egan	40
Duress	10
Burke	26
	207

1717, 1718 1862.
May. Rails repaired:
2,018 lb. coal.
172 " iron.
65 rails.
109 tops repaired.
26 webs.
56⅙ feet.

Jones	19
Duress	8
Burke	38

1862.
June. Rails repaired:
7,445 lb. coal, $8½
642 " iron, 3¼
255 rails.
407 tops repaired.
88 webs "
207½ feet "

Cushing	63
Egan	35
Duress	63
Burke	94
	255

1719, 1720 1862.
July. Rails repaired:

6,198 lb. coal	$8½
534 " iron	3¼

243 rails repaired.
367 tops repaired.
76 webs "
173 feet "

Bennett	49
Cushing	63
Egan	16
Duress	58
Burke	57
	243

Jones 79
Cushing 38
Duress 58
Burke 17

1863.
April. Rails repaired:
6,430 lb. coal, $9.50.
496 lb. iron, 5c.
190 rails.
263 tops repaired.
55 webs "
140½ feet.
Jones 36
Bennett 48
Egan 37
Cushing 30
Duress 39

190

1729, 1730 1863.
May. Rails repaired:
4,768 lb. coal, $9.50.
319 lb. iron, 5.
146 rails.
180 tops repaired.
45 webs "
95⅓ feet.
Jones 82
Bennett 53
Burke 7
Duress 4

146

1863.
June. Rails repaired:
3,249 lb. coal, $10.
274 lb. iron, 5.
120 rails.
156 tops repaired.
14 webs "
75 ft.
Jones 34
Bennett 6
Duress 24
Burke 56

120

1731, 1732 1863.
July. Rails repaired:
1,824 lb. coal, $10.
145 lb. iron, 5.
63 rails.
80 tops repaired.
10 webs "
42 ft.
Burke 66

1863.
August. No rails repaired; the' were at work at Durfield River bridge, which had been burned.

1863.
Sept. Rails repaired:

2,392 lb. coal, 10.50.
160 lb. iron, 5c.
70 rails.
84 tops repaired.
16 webs.
40 feet.

Bennett	9
Cushing	7
Burke	64

1733, 1734 1863.
Oct. Rails repaired:

5,947 lb. coal, $10½.
484 lb. iron, 5.
192 rails.
246 tops repaired.
37 webs "
121½ feet.

Bennett	84
Jones	3
Cushing	62
Burke	43
	192

1863.
Nov. Rails repaired:

7,787 lb. coal, $10½.
650 lb. iron., 5¼.
264 rails.
351 tops repaired.
46 webs.
172½ feet.

Jones	206
Cushing	30
Egan	28

1735, 1736 1863.
Dec. Rails repaired:

7,944 lb. coal, $10⅕.
572 lb. iron, 5½.
206 rails.
276 tops repaired.
31 webs "
145 feet "

Bennett	46
Jones	3
Cushing	83
Egan	24
Burke	50
	206

1864.
Jan. Rails repaired:
8,337 lb. coal, $11.
586 lb. iron, 6¼.
239 rails.
294 tops repaired.
39 webs.
155½ ft.
Bennett 6
Jones 66
Cushing 47
Egan 34
Duress 47
Burke 39

1737, 1738 1864.
Feb. Rails repaired:
9,446 lb. coal, $11.
752 lb. iron, 6¼.
384 tops repaired.
288 rails "
30 webs "
200 feet.
Bennett 84
Jones 89
Cushing 69
Egan 46

1864.
March. Rails repaired:
9,116 lb. coal, 11½.
647 lb. iron, 6¼.
263 rails.
317 tops repaired.
68 webs.
Bennett 3
Jones 61
Cushing 89
Egan 46
Duress 46
Burke 24
269

1739, 1740 1864.
April. Rails repaired:
5,861 lb. coal, $11½.
435 lb. iron, 6½.
145 rails.
189 tops repaired.
28 webs "
101 feet.
Cushing 16
Jones 71
Bennett 58

1864.
May. Rails repaired:
2,683 lb. coal, $11½.
171 lb. iron, 7.

66 rails.
73 tops repaired.
4 webs.
35⅔ ft.
Stone 23
Bennett 2
Duress 41

1741, 1742 1864.
June. Rails repaired:
1,216 lb. coal, $11½.
102 lb. iron, 7.
32 rails.
43 tops repaired.
4 webs "
23 ft. "
Stone 26
Bennett 6

1864.
July. Rails repaired:
4,226 lb. coal, $11½.
330 lb. iron, 7.
111 rails.
127 tops repaired.
10 webs "
64½ ft.
Stone 54
Burke 40
Bennett 17
111

1743, 1744 1864.
Aug. Rails repaired:
5,865 # coal, $11½.
282 # iron, @ 7 c.
169 rails.
115 tops repaired.
15 webs "
60 feet.
Bennett 6
Burke 62
Stone 62
Egan 39
169

1864.
Sept. Rails repaired:
6,953 lb. coal, $11½.
302 lb. iron, 7.
216 rails.
125 tops repaired.
10 webs "
63½ ft. "
Bennett 51
Stone 74
Egan 20
Duress 46

Burke..... 25

216

1745, 1746

1864.

Oct. Rails repaired:

6,554 lb. coal, $15.
314 lb. iron, 7.
248 rails
140 tops repaired.
19 webs "
74½ ft.

Cut rails:

Egan..... 23
Bennett..... 111
Stone..... 29
Burke..... 34
Bennett..... 51

1864.

Nov. Rails repaired:

6,309 lb. coal, $15.
434 lb. iron, 7.
178 rails repaired.
178 tops "
22 webs "
96 ft. "

Burke..... 72
Duress..... 30
Bangs..... 47
Bennett..... 4
Egan..... 25

1747, 1748 1864.

Dec. Rails repaired:

5,066 lb. coal, 15.
371 lb. iron, 7.
118 rails repaired.
138 tops "
18 webs "
79½ feet "

Egan..... 44
Bennett..... 59
Stone..... 15

1749, 1750 1865.

Jan. Rails repaired:

11,311 lbs. coal, $15.
747 " iron, 7.
226 rails repaired.
270 tops "
30 webs "
155½ ft. "

Bennett..... 26
Burke..... 73
Stone..... 72
Bangs..... 31

226

1865.
Feb. Rails repaired:
9,437 lbs. coal, $15.
640 " iron, 8½.
246 tops repaired.
228 rails "
28 webs
140⅜ feet
Bennett 54
Burke 36
Duress 51
Stone 42
Bangs 21
Egan 24

1751, 1752 1865.
March. Rails repaired:
8,404 lbs. coal $15
546 " iron 8½
240 rails repaired.
215 tops "
21 webs "
113½ ft.
Egan 20
Burke 24
Bennett 80
Stone 76
Duress 40

1865.
May. Rails repaired:
5,510 lb. coal $15
296 " iron 6
190 rails repaired.
116 tops "
10 webs "
61 ft. "

1865.
June.
7,094.
542 iron.
227 rails.
220 tops repaired.
1753, 1754 20 webbs.
127 feet.
83, Burke.
52, Stone.
53, Bennett.
8, Egan.
31, Duress.
227

1865.
July.
6,986 coal.
126 iron.
279 rails.
97 tops rep'd.

32 webbs.
53½ feet.
2, Bennett.
45, Burke.
4, Stone.
80, Egan.
41, Duress.
107, Minor.

279

1755, 1756 1865.
August.
347 iron.
8,571 coal.
330 rails.
160 tops.
1 webb.
95 feet.
14, Bennett.
6, Burke.
68, Stone.
72, Egan.
55, Duress.
115, Miner.

330

September. 468 iron.
7,112 coal.
273 rails.
229 tops.
114¼ feet.
104, Bennett.
70, Stone.
59, Burke.
40, Miner.

273

1757, 1758 1865.
Oct.
314 lb. iron.
7,232 lb. coal.
274 rails.
158 tops repaired.
1 webb.
95 ft. 3 inches.
Rails:
61, C. Miner.
4, Burk.
34, Duress.
154, Bennett.
21, Egan.

274

1865.
November. 434 lb. iron.
6,520 " coal.

227 rails.
174 webs.
91 feet.

Rails.	Sec.
54, Bennett	1
Burke	2
50, Stone	3
48, Egan	4
70, Duress	5
Miner	6
5, Bangs	yard.

227

1759, 1760 1865.
December. 635 lb. iron.
7,892 " coal.
225 rails.
Tops repaired.
Webs "
121 ft. 8 inches.
83 Egan.
62 Minor.
9 Bangs.
26 Duress.
45 Stone.

225

1866.
January.

627 lb. iron	37	62
8,785 " coal, 10.50	46	12
242 rails		
248 welds		
$122\frac{1}{6}$ feet		
Labor	135	
	218	74

(Pr. rail . . . . . $.90\frac{1}{2}$
" foot 1.79
" weld . . . . . $.88\frac{1}{4}$)
20 Duress.
12 Bangs.
37 Minor.
48 Egan.
70 Burke.
41 Stone.
14 Bennett.

242

1761, 1762 1866.
February.

577 lb. iron	34	62
7,689 " coal	40	37
214 welds		
175 rails		
128 feet 4 inches		
Labor	126	83
	201	82

(Per rail, 1.15⅓; weld, .94′; foot, 1.57.)

Sec.	Rails:	
1.	Bennett	38
2.	Burke	23
3.	Stone	34
5.	Duress	27
6.	Miner	49
7.	Bangs	4
		175

1866.

March.	581 lb. iron		34 86
	8,989 " coal		47 39
	227 welds		
	253 rails		
	120 feet 2 inches		
	Labor		145 85
			228 10

(Welds, 1.00²; rails, 905; feet, 1.89².)

	Rails:	
1.	Bennett	101
2.	Burke	40
3.	Stone	34
5.	Duress	50
6.	Miner	27
7.	Bangs	1
		253

1763, 1764	April.	Rails		166	
		Welds		181	
		Coal, lb	38 76	7,384	
		Iron, lb	28 50	475	
			67 26		
		Feet		92	
		Labor			138 33
		Rails			67 26
					205 59

2.	Burke	54
4.	Egan	24
5.	Duress	27
6.	Miner	36
7.	Bangs	25
		166

Rail	$1 24
Foot	2 17
Weld	$1 14

1866.

May.	222 rails.	
	110 welds.	
	323 webs.	
	7,000 lb. coal	36 75

58 lb. iron 34 86
61 feet 1 inch .....
Labor 149 29

220 90

Sec. Rails:
2. Burke 20
" 41
3. Stone 33
1765, 1766 6. Miner 32
7. Bangs 96

222
Rails ..... 99^2
Welds 2.01
Feet 3.61

1866.
June. 223 rails.
215 welds.
534 lb. iron 32 04
6,145 " coal 32 26
100 feet 6 inches .....
Labor 140 84

205 14

Rails: Sec.
64. Bennett, 1.
30. Burke, 2.
20. Duress, 5.
30. Minor, 6.
43. Bangs, 7.
Rails 92
Welds ..... 95^2
Foot 2.04

1767, 1768 1866.
July. 112 rails .....
100 welds .....
269 iron 16 14
4,324 coal 22 70
50 feet 2 inches .....
Labor 102 91

140 75

Rails. Sec.
22 Stone 3
48 Bangs 7
42 Burke 2

112
140.75.
112 rails, $1.25\frac{3}{4}$
100 welds, $1.40\frac{3}{4}$
$50\frac{1}{6}$ foot, 280^2

1866.
Aug. 106 rails .....
38 welds .....

	98 iron		5 88
	2,724 coal		14 30
	20 feet 1 in		
	Labor		142 29
			162 47

	Rails.	Sec.	
	83 Bangs	7	
	23 Duress	5	
	106 rails		1 53[1]
	38 weld		4 27[3]
	20½ foot		8 09
1769, 1770 1866.			
Sept.	50 rails		
	28 welds		
	83 iron		4 96
	1,517 coal		7 96
	17 feet		
	Labor		127 17
			140 09

	Rails.	Sec.	
	23 Duress	5	
	25 Bangs	7	
	2 Burke	2	
	50 rails		2 80
	28 weld		5 00
	17 foot		8 24
1866.			
Oct.	111 rails		
	88 webs		
	205 iron		12 30
	3,634 coal		19 07
	44 feet 9 in		
	Labor		68 38
			100 75

Rails:

Sec.	Name.	No.
1	Bennett	32
3	Stone	25
7	Bangs	54
		111

1771, 1772 1866.		
Nov.	192 rails	
	106 welds.	
	392 iron.	
	6,213 coal.	
	50 ft. 8 in.	
	Labor	103 59

Rails:

53 Bangs.
4 "
71 Duress

64

192

1866.
Dec. 202 rails.
114 welds.
62 feet.
360 iron.
7,027 coal.
Labor 130 66

Rails:
31 Bangs.
60 Duress.
22 Bennett.
48 Minor.
41 Stone.

202

1773, 1774 1867.
Jany. 221 rails .....
234 welds .....
615 iron, 5c 30 75
9,225 coal 36 90
129′ 7″
Labor 142 29

209 94

Rails:
37 Egan.
18 Burke.
8 Bangs.
31 Finn.
75 Stone.
52 Duress.

221

1867.
Feby. 194 rails .....
238 welds .....
652 iron, 5c 32 60
8,864 coal, 8 ..... 35 45
130 ft. 11 in .....
Labor 118 83

186 88

Rails:
47 Sec. 2.
36 " 3.
50 " 4.
61 " 7.

194

1775, 1776 1867. Mar. 206 rails .....
247 welds .....
700 iron 35 00

	9,007 coal		36 02
	141 ft. 4 in		
	Labor		121 95
			192 97

	Rails:	
16	Sec. 1.	
6	" 2.	
56	" 4.	
77	" 6.	
51	" 7.	
206		

1867.

Apr.	170 rails		
	109 welds		
	516 lbs. iron		25 80
	6,683 lbs. coal		26 73
	109 feet 5 in		
	Labor		127 77
			180 30

	Rails.	Sec.
46	Egan	3
45	Stone	4
2	Bennett	2
63	Duress	6
14	Bangs	1
170		

1777, 1778	1867. May. 235 rails		
	141 welds		
	350 iron		17 50
	7,653 coal		30 61
	79. 9 feet		
	Labor		105 42
			153 53

	Rails.	Sec.
20	Bennett	2
54	Egan	5
27	Stone	4
70	Duress	6
27	Finn	7
37	Burke	3
235		

1867.

June.	162 rails		
	140 welds		
	347 lb. iron		17 35
	7,673 lb. coal		30 69
	76 ft. 4 in		
	Labor		93 58
			141 62

Rails.		Sec.
28	Bennett	2
31	Egan	5
34	Stone	4
35	Finn	7
34	Bangs	1
162		

1779, 1780 1867. July. 201 rails
201 welds

550 lbs. iron 5c		27 50
7,481 lbs. coal		29 92
101 feet 8 inches		
Labor		140 84
		198 26

Rails:
60 Stone.
10 Bangs.
70 & 42 Finn.
29 Burke.
201

1867.
August. 179 rails
179 welds

461 lb. iron 5c		23 05
5,970 lb. coal		25 37
93 ft. 8 inches		
Labor		119 04
		167 46

Rails:
29 Bangs.
117 Burke.
33 Finn.
179

1781, 1782 1867. September. 210 rails
192 welds

477 lb. iron		23 85
8,020 lb. coal 8		32 08
104 ft. 5 inches		
Labor		129 54
		185 47

Rails.		Sections.
49	Bennett	2
20	Bliss	6
55	Stone	4
77	Burke	3
9	Bangs	1
210		

1867.
Oct. 121 rails .....
149 welds .....
383 lb. iron 19 15
4,860 lb. coal 19 44
86.1 feet .....
Labor 146 25

184 84

Rails:
45 Bennett.
35 Burke.
41 Bangs.

121

1783, 1784 1867.
November. 138 rails .....
159 welds .....
436 iron 21 80
5,040 coal 20 16
89-10 feet .....
Labor 135 41

177 37

Rails:	Sections.
7 Bennett	2
31 Duress	6
46 Bangs	1
54 Finn	7

138

1877.
December. 201 rails .....
646 iron 32 30
285 welds .....
8,280 coal, $8 ..... 33 12
138 feet .....
Labor 135 41

200 83

Rails:
51 Egan.
8 Finn.
40 Duress.
39 Bangs.
63 Stone.

1785, 1786 1868.
January. 146 rails.
536 iron.
182 welds.
6,460 coal.
101-9 feet.

Rails:
52 Duress 5
26 Bliss 6
20 Bangs 1

48 Finn 7

1868.
February. 69 rails.
74 welds.
219 lbs. iron.
2,880 lbs. coal.
1,800 lbs. " drawing iron.
44 feet & 3 in.

Rails:
54 Finn 7
15 Bangs 1

1787, 1788 1868.
March. 35 rails.
47 welds.
129 iron.
1,625 coal.
25 feet 10 in.

Rails:
35 Stone.

1868.
April. 66 rails.
83 welds.
230 iron.
2,880 coal.
42–6 feet.

Rails:
14 Bangs 1
15 Duress 7
37 Bliss 5

1868.
May. 78 rails.
78 welds.
222 iron.
3,240 coal.
43–11 feet.

Rails:
24 Bangs.
34 Bennett.
30 Duress.

1789, 1790 1868.
June. Minus.

1868.
June. Minus.

1868.
July. 111 rails.
105 welds.
307 iron.
3,445 coal.
56½ feet.

Rails:
14 Bangs 1
30 Bennett 2
64 Bliss 5

1868.
Aug. 95 rails.
53 welds.
151 iron.
4,940 coal.
30 feet 9 in.
Rails:
44 Duress.
51 Bangs.

1791, 1792 1868.
Sept. 181 rails.
164 welds.
428 iron.
5,675 coal.
87 feet 11 in.
Rails:
118 Bangs.
63 Bennett.

1868.
October. 221 rails.
193 welds.
495 iron.
6,885 coal.
106 feet 5 in.
$24\frac{3}{4}$ days.
Rails:
128 Bangs.
103 Bennett.

231

1868.
November. 33 rails.
31 welds.
80 iron.
1,015 coal.
17 feet 4 in.
Rails:
Bangs, 33.

1793, 1794 1868.
December. 204 rails.
196 welds.
573 lbs. iron.
6,565 coal.
105 feet 5 in.
Rails:
157 Bliss.
47 Bangs.

1869.
January. 70 rails.
92 welds.
252 lbs. iron.
2,800 coal.
55 feet 3 in.

Rails:
18 Bangs.
23 Bennett.
29 Bliss.

1869.
February. 100 rails.
126 welds.
349 iron.
4,060 coal.
73 feet 9 in.
Rails:
37 Duress.
63 Finn.

1795, 1796 1869.
March. 54 rails.
61 welds.
162 lbs. iron.
1,980 lbs. coal.
Rails:
34 feet 3 in.
20 Bennett, sec. 2.
21 Duress, " 7.
18 Bangs.

1869.
April. 109 rails.
87 welds.
200 lbs. iron 10
3,600 lbs. coal 14 40
41 feet.
Rails:
78 Bennett.
31 Hale.

1869.
May. 84 rails.
176 lbs. iron.
5,520 lbs. coal.
69 welds.
Feet.

1797, 1798 1869.
June. Rails:
70 rails.
67 welds.
180 lbs. iron 10 80
2,160 lbs. coal 8 64
34 feet 6 in.

1799, 1800 EXHIBIT C, *referred to in the deposition of Daniel L. Harris, being memoranda-book rail repairing Conn. R. R. Co., to wit:*

1869.
January. 70 rails.
92 welds.
252 lbs. iron.

2,800 lbs. coal.
55 feet 3 in.
Rails:
18 Bangs.
23 Bennett.
29 Bliss.

1869.
February. 100 rails.
126 welds.
349 iron.
2,060 coal.
73 feet 9 in.
Rails:
37 Duress.
63 Finn.

1801, 1802 1869.
March. 54 rails.
64 welds.
162 iron.
1,980 coal.
34 feet 3 in.
Rails:
20 Bennett.
21 Duress.
18 Bangs.

1869.
April. 109 rails.
87 welds.
200 lbs. iron.
3,600 lbs. coal.
41 feet.
Rails:
78 Bennett.
31 Hale.

1869.
May. 84 rails.
60 welds.
176 iron.
5,520 coal.
Feet.
Rails:
84 Bangs.

1803, 1804 1869.
June. 70 rails.
67 welds.
180 lbs. iron.
2,160 coal.
34 feet 6 in.
Rails:
70 Bangs.

1869.
July. 59 rails.
61 welds.

152 lbs. iron.
1,920 lbs. coal.
29 feet 9 in.
Rails:
59 Bangs.

1869.
August. Rails.
Welds.
Iron.
Coal.
Feet.

1805, 1806 1870.
February. 151 rails.
204 welds.
525 iron.
6,000 coal.
114 $\frac{5}{12}$ feet.

1870.
March. 74 rails.
100 welds.
208 lbs. iron.
2,760 lbs. coal.
51 feet 6 in.

1870.
June. Rails:
166 rails
183 welds.
443 lbs. iron.
6,060 lbs. coal.
101 feet 10 in.

1870.
July. 135 rails.
106 welds.
245 lbs. iron.
4,680 lbs. coal.
55 feet 7 in.

1807, 1808 1870.
October. 81 rails.
97 welds.
215 lbs. iron.
2,640 lbs. coal.
49 $\frac{5}{12}$ feet.
November. 127 rails.
147 welds.
32 $\frac{1}{4}$ iron.
3,800 coal.
77 feet.
December. 144 rails.
79 welds.
394 lbs. iron
4,800 lbs. coal.
91 feet, 2 in.
Rails:
No. 1 Bangs 43
3 Jones 67

1871.
January. Rails:
No. 1 Bangs 20
3 Jones 50

1809, 1810 1871.
February. Rails:
3 Jones 10
6 Hale 13
Duress 14

1871.
March. Rails.
1 Bangs 13
2 Bennett 13

1872.
January.
Sec. Rails:
5. 12–21 ft. rails.
8. 20–24 " "
9. 27 "

1872.
February. Sec.
2. 12 rails.
7. 15 "
8. 16 "
9. 24 "

1811, 1812 1872.
March. Sec. ※2. 10–24 ft. rails.
※7. 6–24 " "
13–21 " "
April. ※3. 8–24 ft. rails.
※4. 14–24 " "
※5. 25–21 " "
" 25–18 " "

1872.
May. Sec. ※5. 13–24 ft. rails.

1813 *Testimony in rebuttal.*

Testimony taken before Henry W. Bishop, master in chancery of said court, for complainant in rebuttal, Tuesday, Dec. 16, 1873.

WILLIAM T. RAGLAND.

Q. 1. Please state your name, age, residence, and occupation.

A. William T. Ragland; age, fifty-eight; residence, Chicago; occupation, mechanical engineer.

Q. 2. Have you or not been examined in this cause before?

A. I have.

Q. 3. State whether or not you have recently visited the rail-mending shop of E. Lebart, at Little Falls, New York; and, if so, when, at whose request, and under what instructions you did so.

A. I have visited his shop on the New York Central Railroad, at Little Falls, November the 15th, at request of the plaintiff in this case. I was instructed to go there on the line of the New York Central Railroad, and visit the different repair-shops that were repairing rails, learn what they were doing there, to what extent they were patching

1814 rails, what machine, if any, they used there, get all the facts in regard to their mending their rails there, and learn the whole truth of the matter.

Q. 4. State whether or not you found any repairing going on at any other point on the line of that road than at Little Falls.

A. None, except at Little Falls.

Q. 5. Please state fully how long you remained in Mr. Lebart's shop, and what you observed in reference to the mending of rails in that shop, and the rails which had been mended there.

A. I was in Lebart's shop from about 9.30 to 12 at noon. I returned at 1 o'clock and remained there till 3.25. During all that time they were patching rails on the common anvil. Some few of the rails were cut off at one end, and a patch put on varying from 2½ to 3 inches; they were using light hammers, I should judge, not to exceed two pounds in weight, the rails being the old "T" pattern they were working on, by an open fire and power-blast. I had a conversation with Mr. Lebart as to the amount he received per rail, and also who furnished the material. He stated to me that he was getting sixty-two and one-half cents per rail, the company furnishing the patch-iron, he furnishing labor, tools, and fuel. The iron used for the patch was 2½ by ½ inch. He stated that he could weld from fourteen to sixteen rails per day, two men at the fire. The cost of wages, $1.75 for the forgeman, blacksmith, and $1.25 for the helper; that is the present wages; has paid $2.50 and $1.75; uses about twelve tons of coal per month; runs three fires; don't know how much it takes to run a fire; never weighed it; says he can mend sixteen rails per day, to average twenty-one inches per rail; when told it would make twenty-eight feet per day, thought it would not be so much, as he did not keep any account of measurements. The actual work done in my presence was from two to eleven inches on one end of the rail; forty rails were laid at the shop-door that had been patched; after some dispute with him about the amount and length of patch,

1815 he took a rule and they were measured in my presence. I will give you the result of the memorandum I have what the rails measured:

1	rail,	12	inches.
1	"	11	"
1	"	11½	"
8	"	7	" each, 56 inches.
4	"	6½	" " 26 "
21	"	2	to 6 inches, average 4 inches.

Total, 84 inches.
4 rails not patched, but cut and welded on one end.
Total of inches, 200½; average per rail, 5.56-100.

I omitted to state that there was a block, a machine for welding rail, in the shop, of the Davis pattern; the jaws were made to fit the fish-joint rail. He stated that his blacksmith could not weld the fish-joint rail without the use of this machine. There was in the rear of the shop a number of fish-joint rails been thrown aside. He took the rule, measured the fractures on several of the rails, showing they required from one to three feet. When asked if he patched that work for the same price, namely 62½ cents a rail, said he could not do it, as he would lose money on the job; but if the road-master insisted, he must mend them, and take the bitter with the sweet.

(The defendants object to such of the above answer as relates to what

was said and done by Lebart, the proper foundation for such examination not having been laid when said Lebart was examined as a witness in these cases; also objects because the answer is not responsive, and because the whole answer is incompetent and irrelevant.)

Q. 6. Who put the rule onto the rails and made the actual measurements?

(Defendants here interpose the same objection as that above made to this question, and all of a similar character.)

A. Mr. Lebart.

1816 Q. 7. When an estimate was made of the number of inches his statement of a day's work would amount to, did you or not tell him that would come to 28 feet, and did he or not say he never mended as much as that?

A. His answer was: It would not be as much as that.

Q. 8. State whether or not the result arrived at as the average measurement of the forty rails measured was in conformity with your understanding of what he considered the average mend on those rails before they were measured.

A. Judging from the remark he make when he called my attention to the long patches, remarking that there was three rails would measure from 16 to 18 inches each—the patch when measured was 12, 11½, and 11 inches—I think from that remark, made by him in regard to the number of inches before being measured, that he had overestimated what he put on the rail when stating he had done 21 inches; and also that he had not a good eye for measuring distances.

(Objected to for the same reasons given above, and also because it gives the witness' opinion, which is not evidence.)

Q. 9. As the work was carried on in that shop, state whether or not the rails required much handling in getting them into the fire.

A. In getting the rails from the pile outside, the rail was moved about its length. One end of it being placed on a roller, at the other end a man, with a dog, moved the rail ahead until the fore end of the rail was opposite the forge; the rear end of the rail was then laid in the slings of the crane, and the fore end of the rail was picked up and laid on the fire, the rail then being in nearly a horizontal position.

Q. 10. State whether or not you examined the character of the work done upon the forty rails you saw there; if so, state what it was, and whether or not any of the rails needed patching done upon them at the other end, which they had not received and were not to receive;

1817 and, if so, what proportion of the whole number, should you say, should have been worked on at the other end also?

A. The character of the work done on the rails that I saw patched there was of an inferior quality of workmanship, both rough on the surface and on the sides of the rail. The entire upper configuration of the rail of the length of the patch being entirely destroyed. The opposite ends of the rails, or a portion of them, about one-third of the number that was there, to make a complete job of the rail, should have been patched on the other end, and required a patch from two to three inches.

Q. 11. State whether or not you have recently visited Venice, Illinois, on the line of the Chicago & Alton Railroad; and, if so, when, who was with you, and under what instructions did you go there?

A. I was at Venice, on the line of the Chicago & Alton Railroad, December the 1st; I had Mr. Thomas M. Rippon with me; I was instructed to go there and ascertain if there was any patched rail in their tracks in and about that station, and, if so, to measure the length of the patches and take a memorandum of the same; the measurement to be done jointly between myself and Mr. Rippon.

Q. 12. State whether or not you were instructed by complainant's counsel to measure every patched rail you found and bring him the memorandum of the measurements?

A. I was so instructed.

Q. 13. State whether or not you did find any patched rail in the track of the Chicago & Alton Railroad Company, and whether or not you examined and measured the patches upon all such rails, and in what manner you proceeded in measuring them?

A. I did find a number of patched rails in the track of the Chicago & Alton Railroad transfer-yard at Venice; I did examine and measure the patches on all rails found there; I started at one end of the track, being the side-track, where it intersected with the main line; I followed
1818 that along, examining each rail as I passed along; each rail that I found patched I measured the patches or patch of each rail as I came to them; I followed that track out to its terminus; I then took the main side-track that is connected at both ends with the main track; I followed that along, examining the rails as I proceeded along, measured each and every patched rail that I found, as far as the track was clear; some portions of it (the track) being blockaded with cars, I did not there examine that iron as regards the patches; I then proceeded on to another spur-track; also measured the patches on all the rails I found patched in that track; that includes about all the tracks that I passed over in that place; there was another track there coal-cars were standing on; I was not positive about its being their track; inquired of one of their men there, and he could not positively tell me whether it was or not their track; in that track in question I didn't measure any iron; measuring the other iron, before spoken, I kept a memorandum in inches of all the patched rails and each patch on the rail.

Q. 14. State how you are able to distinguish a patched rail, and also whether or not you can distinguish a patch welded upon the rail in a jaw-block machine from one welded upon it in a Bain rolling machine; and if so, how you can distinguish it.

A. I distinguish a patched rail from the line of the scarf across the head of the rail at the point where the patch is put on. Where the iron is clean the scarf is discerned by the difference in the shade of the iron showing a direct line across the head of the rail where it has been upset and the patch scarfed on. The patch in the jaw machine is distinguished by the abrasions made on the side of it by the side swage, thereby somewhat altering the thickness of the head of the rail from the point where the patch is scarfed to the end of the patch on both sides of the rail. In the Bain rolling machine the patches are forged, the scarf being made on the end of the patch in a sort of diamond-shaped
1819 end. The side of the rail being passed through the side rollers, shows about the same configuration on the side of the rail where the patch is as other parts of the rail. I further distinguish the block work or Cawood machine from the roller patch, that in patches exceeding the length that can be taken at one heat you will find a scarf at the terminus of that heat. Those scarfs, on a long patch, will vary in number in proportion to the length of the patch.

Q. 15. State in what machine the patches you examined at Venice had been welded on to the rails.

A. Judging from the facts above stated, I would say they were welded on with the Cawood machine.

Q. 16. When you speak of the Cawood machine, do you or not refer to what has been known as the Cawood machine proper, or to some of the other machines which have been held to be infringements of the Cawood?

A. I refer to the machine known amongst the workmen as the Whitcomb machine, the only difference between that and the Cawood machine being that in the Whitcomb machine the jaw is moved by a rack and pinion.

Q. 17. Referring to the memorandum which you say you made, will you please state the number of patched rails which you measured at Venice, the length of each patch, and such other facts in regard to the patches, if any, as your memorandum enables you to give?

(Objected to.)

A. Referring to the memorandum taken when the measurement was made at Venice, the total number of rails measured is twenty-five, (25;) total number of inches in the length of patches, 629. The length of each patch:

1 mend, middle patch, 24 inches, 1 rail.

Same rail, end, 16 inches.

1 mend, middle patch, 27½ inches, 13½ on the end, same rail.

1 rail, 19½ inches one end.
1 " 18½ " " " 17 the other.
1820 1 rail, 16½ inches one end, 19 the other.
1 " 15 " " " 16 " "
1 " 15 " " "
1 " 16 " " " 18 " "
1 " 16 " " " 18½ " "
1 " 13 " " " 19½ " "
1 " 15½ " " " 17½ " "
1 " 15 " " " 16 " "
1 " 16½ " " " 17 " "
1 " 18 " " " 12 " "
1 " 3½ " " "
1 " 18½ " " " 20 " "
1 " 30½ " middle.
1 " 13 " one end.
1 " 4 inches, one end.
1 " 20½ " " "
1 " 23 " " "
1 " 18 " " "
1 " 15½ " " " 22 the other.
1 " 18 " " "
1 " 7 " " "

Total, 25 rails.

Q. 18. State whether or not Mr. Rippon was with you and took part in the measurement of these mends on these rails; and if so, what part did he take?

A. Mr. Rippon was with me and took part in the measurement, I laying on the rule at the scarf of the patch, calling Mr. Rippon's attention to it, he noting down the number of inches, calling my attention to its being right or wrong. We proceeded in this manner all through the measurement.

Q. 19. State whether or not you subsequently measured any more patched rails on the line of that road, which had been mended in the Whitcomb machine; and if so, at what points on the road, when,
1821 and with whom you made such measurement, and whether or not, in making such measurement, you pursued the same course you describe as adopted by you at Venice.

A. I did measure at Springfield, on December the 2d, patches on rails on

the Chicago & Alton Railroad track at Springfield station, with Mr. Rippon, pursuing the same course in the measurement that we adopted at Venice. The next place I measured rails, or patches on rails, on the Chicago & Alton Railroad tracks was at Bloomington, December the 5th, 1873, with Mr. Rippon, proceeding in the same course as adopted at Venice and Springfield. I also measured patches on rails at Chenoa, December the 14th, 1873, on the Chicago & Alton Railroad tracks, proceeding there in measurement in about the same manner adopted at Venice, having with me to assist in the measurement Mr. George Lounsbery, of Chenoa.

Q. 20. Please state the total number of rails measured by you at each of those points, the total number of inches of mend on those rails, and the length of each mend.

A. Total number of rails measured at Springfield, 18; total number of inches in patches on rails, 659½.

Items at Springfield:

1 rail 14½ inches on one end.
1 " 20 " " "
1 " 27½ " middle, 20 on one end.
1 " 23 " " 16 "
1 " 25 " " 16½ " 21½ on the other.
1 " 21 " one end, 6½ on the other.
1 " 23 " " 19 " "
1 " 20½ " middle, 9½ one end.
1 " 22 " " 13½ "
1 " 26 " " 18½ "
1 " 18 " "
1 " 25½ " " 16½ "
1 " 19 " one end, 21 the other.
1 " 21 " middle, 13 one end, 24 the other.
1 " 48 " "
1822 1 rail 44½ inches middle, 12 one end.
1 " 10½ " " 16 "
1 " 7 " " "

Total, 18 rails.

Total number of rails measured at Bloomington, 32. Total number of inches in patches, 750.

Items at Bloomington:

1 rail 22 inches middle, 13 one end.
1 " 20 " "
1 " 20 " "
1 " 46 " "
1 " 17 " one end.
1 " 20 " middle.
1 " 21 " "
1 " 12 " " 14 one end.
1 " 13 " "
1 " 23 " " 14 "
1 " 12 " "
1 " 5 " one end.
1 " 16 " middle. 9 one end.
1 " 13 " one end.
1 " 9 " "

1 " 12 " "
1 " 23 " middle, 13 one end, 19 the other.
1 " 22 " middle, 10 one end.
1 " 7 " one end.
1 " 8 " "
1 " 9 " "
1 " 14 " "
1 " 14 " "
1 " 23 " middle, 15 one end.
1 " 11 " one end.
1 rail, two middle patches, 1 patch 22 inches, middle one 20 inches middle 14 inches one end.
1823 1 rail, 26 inches middle, 14 one end.
1 " 24 " " 12 "
1 " 24 " " 13 "
1 " 18 " " 16 13 inches the other.
1 " 10 " one end.

Total 32 rails.

Total number of rails measured at Chenoa, 28. Total number of inches in patches, $273\frac{1}{4}$, on one column, viz:

1 rail, 21 inches.
1 " $28\frac{1}{2}$ "
1 " 21 "
1 " $14\frac{1}{2}$ "
1 " $22\frac{3}{4}$ "
1 " $17\frac{1}{2}$ "
1 " 31 "
1 " 26 "
1 " 21 "
1 " 13 "
1 " 12 "
1 " 17 "
1 " 11 "
1 " 17 "

Total $237\frac{1}{4}$ in that column.

In the other column at the same place, Chenoa, total $312\frac{1}{4}$ inches in the second column, viz:

1 rail, $20\frac{1}{2}$ inches.
1 " 31 "
1 " 20 "
1 " 20 "
1 " 24 "
1 " 24 "
1 " $20\frac{1}{2}$ "
1 " $19\frac{3}{4}$ "
1 " $17\frac{1}{2}$ "
1824 1 " 13 "
1 " 21 "
1 " 31 "
1 " 26 "
1 " 24 "

Total, $312\frac{1}{4}$ inches.

Q. 21. State whether or not in the measurements made at Chenoa you have distinguished between middle and end patches, or have returned the patch wherever it was found on the rail.

A. The patch, where measured on the rail, was invariably a patch each end; both patches were added together and noted down as so many inches on that rail.

Q. 22. State whether or not you measured all the rails mended on the Whitcomb machine, which you could find at any of those points?

A. At Venice, Springfield, and Bloomington I measured all the rails in each place that I could find patched; at Chenoa I measured all the rails in the tracks that were clear that I found patched; a large number of cars were standing on one of the side tracks, in which some of the rails may have been patched, but I couldn't get at them to measure them, nor could I examine them, it being very muddy and the rails covered with mud.

Q. 23. State whether or not you observed any rails at Venice that had been cut and had not been patched; and, if so, how many.

(Objected to as immaterial.)

A. I observed in Venice five rails that had been cut each end, one of which had a short patch on one end.

Q. 24. What was the total number of rails measured by you at all the different points, and what was the average mend per rail?

1825 A. Total number of rails measured, 103; total number of inches in patches, 2,623; average per rail, in inches, 25 inches and 46 hundredths; it may have been a fraction over that—a thousandth part of an inch.

Q. 25. State what the condition of the iron was between the patches, as a general thing, as compared with the patched portion of the rails.

A. As a general thing in those rails I found patched, the main body of the iron not having any patches on it was about worn out, while the patches appeared to hold good and was the soundest part of the rail.

Q. 26. State what the quality and character of the iron commonly employed in patching rails is as compared with that of the rail on which it is placed.

A. The iron used in patching rails is common bar-iron; the grain is long and fine, and the iron ductile. The iron of which the rails are composed is of a coarser grain, and much harder to bend than the patch iron; not so ductile as the patch iron. I will answer that more fully by stating that the rail when broken shows an open, short, crystalline grain, while the bar-iron, when bent so as to fracture it, shows a long grain of a bluish cast.

Q. 27. State whether or not since your testimony was given in March, 1870, you have had additional and further experience in the use of the Cawood machine in one or more of its different forms; and, if so, when and where.

A. I have used the Cawood machine in a part of '71 and '72, at Michigan City, mending iron for the Louisville, New Albany & Chicago Railroad.

Q. 28. Will you please describe somewhat more fully than you did in your former examination the method you have seen practiced in using the Cawood machine, and particularly with reference to the position in which the machine is commonly placed as relating to the furnace, and the length of time during which it is necessary to keep the rail in the jaws of the machine in order to weld on the length of patch usually placed there at one heat?

1826 A. The crane which suspends the rail is put in a horizontal line

with the center of the jaws of the machine, and also the center of the furnace in which the rail is to be heat, the crane being above, suspended from the roof or plates of the building, known as a running-crane. The rail is brought in the shop, the fore end of it laid on the block or machine; the other is lifted up and suspended by a chain to the running-crane above; at this time the jaws in the machine are standing open, the rail laying with the tread down on the part of the machine known as the anvil; the rail is then shoved into the fire, a light heat is taken upon it, the loose, exfoliated parts cut off, at the point where the scarf is to be made, with a tool called the fuller, held against that point and stricken on with the sledge until that portion of the face of the rail is raised from a quarter to three-eighths of an inch; the rail is then run into the fire with the tread of the rail down, and the blast turned on; after the rail has attained to a white heat, or nearly so, the blacksmith takes a bar of iron which is to form the patch, places it in the fire beside the rail; the rail and the patch remain in the fire until it has attained a welding-heat; one helper stands at the crane, the other at the block with his hand on the lever; at the motion from the blacksmith, the man by the crane by one sudden jerk hauls the rail out of the fire, and in so doing turns it over; the moment the heated part of the rail passes into the jaws, the man suddenly closes the jaws on the rail; at the same time the blacksmith stands ready with his patch, lays it on that part of the rail to be patched that is heated; the two helpers immediately coming on with their sledges, hammer down the patch, directing their blows on different points of the surface of the patch as directed by the blacksmith, and following him through the hammering with the hand-hammer, they with the sledge; immediately that part is performed, the blacksmith picks up his top-swage, places it on the patch, the swage being made to fit the configuration of the top of the rail, its sides having sharp edges that cut down all
1827 the surplus iron on each side of the rail; the blows then continue to be stricken by the helpers until a motion from the blacksmith signifying them to stop; the helper at the lever of the jaws opens the jaw while the other helper has resumed his place at the crane, and pushes the rail ahead till the end comes through the jaws; the balance of the bar of iron that formed a patch of the rail, and projects over the end of the rail, is then cut off even with the end of the rail; the blacksmith then takes a chisel, holds it in position on the side of the rail in the line as marked by the sharp edge of the swage; the helpers then strike on the chisel and what is known as the fin cut off even with the side of the rail; the helper at the block throws the jaw open, the rail is lifted out, laid in the grooves which are made in the flat surface of the block; the side swage is then used to fit the side of the tread of the rail, the blacksmith holding the swage while the two helpers are striking on it; the rail is then turned over and the operation on the other side is repeated; the rail is then shoved ahead on the block, and what is called the flatter is used by the blacksmith; that is stricken on by the helpers with the sledges, and the end of the rail is squared up by that operation; that completes the patch on the rail.

From the time that the heated part of the rail is clasped in the jaws until the patch is securely hammered on will not exceed two minutes. The whole time of the operation, from the time the rail is brought in until the patch is completed on it, has not been to exceed, at times that I have noted it for ascertaining the fact, eighteen (18) minutes.

Q. 29. State whether or not, in your long experience in the use of these machines, you have met with any difficulty in consequence of the

jaws cooling the portion of the rail above their surface before the proper and solid weld could be effected.

A. I never have.

Q. 30. State whether or not it is desirable to somewhat cool the neck of the rail which is clasped in the machine; and, if so, for what reason.

1828 A. It is desirable to have the neck of the rail cool, as it necessarily prevents it from upsetting in cases where the block does not strictly conform to the configuration of the rail.

Q. 31. State whether in mending rails upon the common anvil, having recesses but no jaws, the portion of the rail upon which the patch is to be welded is brought in contact with cold or cooler iron to a greater or less extent than when the Cawood machine is employed.

A. It is to a greater extent. Now, I go on after it to give the reason why it is so. The side of the rail where the patch is being welded on the surface—the top of the rail—laying on the cold iron will cool that side of the rail, also that side of the patch on the rail where the patch should be firmly united on the top of the rail and the side of the rail also.

Q. 32. When rails are welded in the first instance in rolling them out from the faggot, state whether or not they pass between two cold rolls, and whether or not in the process of welding it is the practice to take measures to keep those rolls cold; and, if so, what is done for that purpose?

A. The rolls, in putting the rails or blooms through the passes, as the rolls are called, *the rolls* are kept as cool as they practically can be done; in order to keep them cool there is a stream of cold water running immediately over the different passes and on the rolls in which the bloom or faggot is being passed through.

Q. 33. In welding a piece of iron on a rail, what sort of blows are calculated to effect the most solid and thorough weld?

A. Heavy blows.

Q. 34. Why is this the case?

A. To firmly unit both pieces of iron that are being stricken upon.

Q. 35. One of the witnesses has stated as the result of his experience that he would not use very heavy blows at first, as it would have a tendency to make the iron fly apart; and again, that with the kind

1829 of iron he used, Swedish iron, under heavy blows it might break in pieces and fly all over the shop. What does a good workman infer when he finds his iron which he is welding is apt to fly to pieces under heavy blows?

A. He would infer then, in that case, that the iron was over heat, and to some extent burned, so that the particles of iron were separated, and being nearly in a state of fusion; when in that state heavy blows would be apt to make it fly, but, when properly heated to what is known as a good welding-heat, which will firmly unite both bodies of the iron, that to be patched and that which is forming the patch will not fly or crumble in pieces, but will present a smooth surface when properly swaged down.

Q. 36. State whether or not it is a general practice in working iron to use as heavy a blow when two pieces are to be welded together as can be brought to bear upon them, and as they can be enabled to resist.

A. That is the usual practice in welding iron.

Q. 37. In your former deposition you made some allusion to the use of the common anvil by you for the purpose of repairing rails during the period of your contract with the Chicago, Alton & St. Louis Road;

will you please state for what reason you resorted to the common anvil, and under what circumstances you made use of it?

A. I did so work a short time on the common anvil. The circumstances were: Messrs. Dunning & Wormley then claimed the right to own the Cawood patent block which I had in use, and threatened, unless I bought the right of them, they would stop me from using it. In order to demonstrate whether I could successfully comply with my contract by mending iron without the use of the block, I put one of my best men to work on the common anvil. After working some days at it with the common anvil, or rather what is known as the common anvil—a cast-iron block with grooves in it—I found then that I could not mend the iron with profit to myself, or in such manner as would be acceptable to the road-master on that division of the road.

1830 Q. 38. State whether or not you offered to pay a sum of money, as royalty, for the use of the machine, and whether or not your offer was accepted.

(Objected to.)

A. I did call on Messrs. Dunning & Wormley in this city, at the Adams House. I made them a proposition that I would give them real estate to the value of five thousand dollars for the license to use the block or machine on the Chicago & Alton Railroad during the life of its patent, which they refused I then offered them a royalty of ten dollars a hundred for all the rails I mended on the machine on that road—the Chicago & Alton Road—proffering to pay them monthly in cash at that rate for the number of rails that I had done, which they also refused.

Q. 39. Will you please state what the average number of rails was per day when you were working upon the Cawood machine at Michigan City?

A. We were averaging about ten rails a day, taking one day with another.

Q. 40. What number of hours were you working, and what was the average length of patch per rail?

A. We worked a portion of the time, while daylight permitted us to do so, ten hours. I think it was in October, the latter part of the month, we commenced working nine hours, and continued on that nine hours through the winter. The average mend per rail was two feet.

Q. 41. During the period of your contract with the Chicago, Alton and St. Louis Road, what was the average length of mend per rail?

A. Eighteen inches.

Q. 42. Will you please state how the time occupied in getting the rail from the furnace into the jaws of the Cawood machine, ready to work upon it, compares with the length of time consumed in getting the rail from the furnace into proper position for work on the common anvil having recesses in it?

1831 A. When using the furnace with the common anvil and a horizontal crane, such as I used, the time would be about equal.

Q. 43. With the same appliances for heating the rail and the same appliances for moving the rail in each case, does it or not take any longer to get the rail into position for work in the jaws than to get it into position for work on the common anvil?

A. It does not take it any longer in the jaws than in the common anvil.

Q. 44. State whether or not it has been your experience that long patches welded on in the Cawood machine were liable to scale off upon being used in the track.

A. I never had any complaints or any iron returned to me from the fact of the patch-iron coming off or scaling, either long or short patches.

Q. 45. Whether or not a long patch can be just as thoroughly welded as a short patch in that machine?

A. It can.

Q. 46. In mending rails on that machine, as you have seen it done, what governs the length of the patch which can be put upon the rail at one heat?

A. The length of the furnace and width of the jaws in the Cawood or Whitcomb machine.

Q. 48. If you have a furnace of sufficient dimensions to heat sixteen or eighteen inches, and jaws of the usual length, is there or not any difficulty in properly welding on a patch of 16 or 18 inches at a heat?

A. There is no difficulty in welding on a patch and finishing it up at one heat, at any length a furnace can heat at one time, with the usual width of jaws.

Q. 49. State whether or not you took notice of the length of single and separate patches on the rails you measured recently on the line of the Alton road.

1832 A. I did take notice particularly of single and separate patches that were on the rails, and found that the patches that run up from 18 to 20 inches and above that were composed of several different scarfs; that is to say, each piece forming a part of a continuous patch varied in length from 12 to 16 inches.

Q. 50. State whether or not when a rail is broken in the flange, it usually requires mending also upon the head or tread of the rail?

A. I don't remember to have put a flange on a rail in any case where the head did not want patching also.

Q. 51. Was it or not a common thing to repair the flanges of rails when you worked at the business?

A. It was usual to so mend them.

Q. 52. State whether or not you measured any iron on the line of the Chicago & Alton Railroad in or about the month of May, 1869, in the presence of and under the observation of John McCormick; and if so, where, who beside McCormick was present, and with what results?

A. We did so measure some iron some time in May, 1869, on the Chicago & Alton Railroad, at the shops in Chenoa. There was present at that time John McCormick, myself, and Samuel H. Turrill. We measured a large number of bars that laid piled up at the shop. The result of that measurement proved to be an average of eighteen inches to the rail. This measurement was made partially at the suggestion of McCormick himself, so that he might know what amount of patch the rails he mended would average.

(Answer objected to by defendants, the proper foundation not having been laid on the examination of McCormick.)

Q. 53. While you were at work at Michigan City, as you have testified, did you cut off any rails and not patch them at all?

A. Only when directed by the road-master to cut off and square up such old rails as were throwed aside and intended to be sent to

1833 the rolling-mill, which he wished to keep there to lengthen out some side-tracks, all such rails having the top of the tread about worn out, and not worth patching.

Q. 54. How often did this occur?

A. Only at one time when he required some old rails to lengthen out a side-track.

Q. 55. Do you know Wm. Costigan?

A. I do.

Q. 56. State whether or not he is a good workman at the business of patching rails.

A. I know Mr. William Costigan to be a A No. 1 rail-patcher, both in quantity of work and style of workmanship.

Q. 57. Has Thomas M. Rippon been present here to-day during the whole of your testimony?

A. He has, sir.

The further examination of this witness is continued to Wednesday, December 17, at 10 a. m.

WEDNESDAY, *December* 17—10 a. m.

Present as-before, and John B. Niles, of defendants' counsel.

Direct examination resumed:

Q. 58. State whether or not, in your experience of mending rails, it has ever happened that a rail upon which a patch had been welded came back to the shop to have another patch welded upon it adjoining the patch previously placed upon it.

A. I have no recollection of any rails being returned to the shop for that purpose. In patching rails we were always particular to cut back as far on the exfoliated part as would bring us to the solid iron before putting the patch on.

Q. 59. You have stated that more or less of the rails you recently examined and measured on the line of the Alton & St. Louis Road showed by the scarfs that more than one patch had been welded on to make up the entire mend. Plea e state whether or not the mend on these rails had been done at one time, or whether the different patches composing the mend could have been put on at different times.

1834 A. In case of middle patches, where the patch was longer than 16 inches, the whole patch was formed by being put on at one and the same time in sections from 12 to 16 inches, thereby making one continuous patch required to repair the rail thoroughly at that point. In the end-patches, in some cases the patch would be 20 inches in length, and in some cases more than 20 inches in length, showing but one scarf; in patches exceeding the above-named lengths, would show two scarfs or more, in proportion to the length of the patch.

Q. 60. State whether the end-patches, which showed more than one scarf, had been put on at one job and while the rail was in the shop at one time, or whether they could have been put on on different occasions.

A. All patches, ends or middle, appeared to be and was, in my judgment, put on at one and the same time, whether formed by one scarf or more.

Q. 61. Can you state why the long middle patches were put on in sections, as you have described, instead of one continuous patch?

A. All patches of that nature in the middle of the rail was put on in such sections in length as they could finish up at one heat, taken in the furnace at each time. These heats would vary in length from twelve to sixteen inches, according as the fire may be in a good state or somewhat clogged with cinders and dirt. One section was firmly welded on at the point of beginning, in about the same length as before mentioned, to finish up to the end of that patch, that being the amount welded at one heat. The end of that patch was cut off on a bevel, in order to receive the next patch. The rail was then placed in the furnace, another heat taken on it; the patch-bar also being heat at the same time, was then laid on at the terminus of the former patch and welded on to the

extent of that heat. The patching continued on in that manner, above described, until it was completed, and the fractured part of the rail entirely restored.

1835 Q. 62. State whether or not you observed any railroad-crossing at Venice, to which steel had been welded by the aid of the machine; and, if so, state, if you can, the number of inches which had been welded onto the rails forming the crossing.

A. There was such crossing at Venice, immediately where the street-crossing run down to the river-bank. This crossing was connected with a track running down to an elevator, crossing a track at the point above named at the Venice transfer-yards. The track it crossed connected at each end with the main track on the Chicago & Alton Railroad. The four rails composing the crossing, two of them was twenty-three feet in length each, the other two twenty-two feet. These rails mentioned formed the crossing complete. At the points where it intersected the other track these rails were separated, leaving a space between the rail on which it crossed of about three inches, or sufficient for the flange of the wheel to run over the tracks it crossed without interfering with that piece of a rail forming part of the crossing. I measured all these separate ends that had steel laid on them—had been welded on, in my judgment, in the swage-block. The total number of inches on all the points and ends of rails forming that crossing that was patched with steel was 165½ inches.

Q. 63. State wether or not they were taking up old rails on the line of that road at the points where you examined the patched rails and replacing them with other rails at the time you were there.

A. They were in Venice and in Springfield.

Cross-examination by Mr. Payson:

X Q. 1. You have been examined before in this case, have you not, Mr. Ragland, on behalf of the plaintiff?

A. Yes, sir.

X Q. 2. Both as an expert and as a witness to facts, have you not?

A. Yes, sir.

1836 X Q. 3. How have you been employed since the last time you were examined?

A. Part of the time in repairing rails at Michigan City, part of the time in a machine-shop in Bloomington; some portion of the time in making repairs on my own premises in Bloomington, and rebuilding.

X Q. 4. Whose machine-shop at Bloomington?

A. John Ollis and the Bloomington Manufacturing Company.

X Q. 5. How were you employed there?

A. As a journeyman.

X Q. 6. What wages?

A. $3.50 in one place, the Bloomington Works; $3.25 at Ollis' shop.

X Q. 7. How are you employed at present?

A. Not in any employ in any mechanical branch at the present time.

X Q. 8. What employment have you?

A. None at the present time.

X Q. 9. How long have you been employed in that way?

A. I will—before answering that question I wish to correct a former question. I omitted to state that I was in the employ of the board of public works in the city of Chicago, from some time in August until the closing of the building-season, as inspector of buildings, in 1872. I have been idle, you may say, in a measure, with the exception of what time I have been employed in this case—well, I think, since November the 10th.

X Q. 10. What were you doing before then?

A. I was in no employ before then, except in my own work.

X Q. 11. How often have you testified in this case, or in any other, concerning this patent?

A. Well, I am not positive; I think this is the fourth or fifth time.

1837 X Q. 12. For the plaintiff in each instance?

A. For the plaintiff.

X Q. 13. When did you first testify in regard to said patent?

A. I think it was in '62.

X Q. 14. How long have you known the plaintiff?

A. I think since '57 or '8. I am not positive about the time.

X Q. 15. What interest have you in this suit, or in this patent?

A. None. I expect to get paid for my time in this matter.

X Q. 16. How intimately have you been acquainted with the plaintiff?

A. Well, I might say quite intimately.

X Q. 17. Is there any relationship between you?

A. None, to my knowledge.

X Q. 18. When and where did you first make his acquaintance?

A. In the city of Chicago. I am not positive, but I think it was in '58.

X Q. 19. When did he first talk with you in regard to this patent?

A. At the time it passed out of the hands, or about that time, of Dunning and Wormley; I think it was in '58, in the spring of '58 I think it was. I might rather add to that, that Mr. Dunning told me he had nothing further to do with the patent. As regards Wormley's interest, I don't know whether he had parted with it or not.

X Q. 20. The plaintiff has consulted you constantly in regard to the matter ever since, has he not?

A. We have conversed about the patent and its uses at different times.

X Q. 21. How often?

1838 A. I am unable to state the number of times.

X Q. 22. Have not those consultations been very frequent and very full?

A. No, sir; not very frequent; there has been times that I haven't seen Mr. Turrill nor heard of him from six to twelve months.

X Q. 23. You lived with him once, didn't you?

A. No, sir.

X Q. 24. Were you not at the same hotel together?

A. We was; I was there myself merely as a temporary guest.

X Q. 25. How long were you there?

A. I think the longest time was between two and three weeks; I don't remember the exact number of days.

X Q. 26. You were there more than once, were you not?

A. I may have been there twice; if so, it was but for a few days.

X Q. 27. He has paid you considerable money from time to time, has he not?

A. When in his employ in these cases, he has paid me about the rate per day that I would get when employed in my legitimate business, paying my expenses at the same time.

X Q. 28. How much would that be?

A. From four to five dollars per day.

X Q. 29. Didn't you make a good deal more than that whilst you were working for the Chicago & Alton?

A. As a contractor, yes.

X Q. 30. How much more?

A. As a contractor I probably averaged about six dollars a day over and above expenses. I don't remember definitely, as all my old papers, relating to that work, when contracting there, have been destroyed.

1839 X Q. 31. How long have you been so employed by the plaintiff, taking all of the times together, in this suit or in any other relating to the patent?

A. I can only guess at the matter of time; perhaps altogether, may be, sixty days.

X Q. 32. Hasn't it been three times that amount of time?

A. I did not include in my former answer this present employment in this case.

X Q. 33. What would be your answer, including this time?

A. Probably 130 days; somewhere thereabout. I want to correct that; I don't mean 130 days; somewhere about 100 days, up to the present time.

X Q. 34. Then, you have been employed 40 days at this time, have you?

A. Up to to-day will make 37 days, including Sundays.

X Q. 35. You went to Little Falls as a part of that employment, did you?

A. Yes, sir.

X Q. 36. And you have been up and down the line of the Chicago & Alton Railroad as another part?

A. Yes, sir.

X Q. 37. Where else have you been?

A. I was in different shops on the line of the New York Central Railroad, from Buffalo to Little Falls.

X Q. 38. How many?

A. I was at Buffalo, Rochester, Syracuse, Rome, Utica, and Little Falls.

X Q. 39. Is that all?

A. That is all, sir, I think.

X Q. 40. How many shops at each place?

A. One.

X Q. 41. For what purpose?

1840 A. To learn what they were doing in the way of mending railroad-bars on that line of road.

X Q. 42. With a view of testifying in this case in regard to it?

A. That was not the understanding when I left here.

X Q. 43. What was the understanding?

A. To go on that line, learn the facts connected with the mending of rails, what price the contractors had per rail, how much each patched on the rail, fuel and iron used, and all other things in connection with patching of rails.

X Q. 44. You were to get this information for Mr. Turrill?

A. I received these instructions from counsel for the plaintiff, Mr. Curtis.

X Q. 45. The question was, were you to get this information for Mr. Turrill, not who gave you the instructions.

A. I supposed that the information was for the benefit of the plaintiff in this suit.

X Q. 46. Don't you know it?

A. Well, as well as I can know anything that I am not a party directly in interest with.

X Q. 47. Was Mr. Turrill present when his counsel gave you those instructions?

A. I think Mr. Turrill was in the same room, but standing apart from us.

X Q. 48. Do you mean to say that he took no part in the conversation?

A. He may have mentioned a word or two at the time, stepping up and stepping back again, but no general part in them instructions that I received from Mr. Curtis.

X Q. 49. Do you mean to say that you never talked with Mr. Turrill about this journey?

A. After receiving these instructions, and about at the time of
1841 starting, some portion of the instructions I received from Mr. Curtis was repeated by him, (Mr. Turrill,) with the injunction that I should thoroughly investigate it, and return as soon as I could.

X Q. 50. Why, then, when I asked you at first, did you say you got your instructions from Mr. Curtis?

A. Because I did.

X Q. 51. Didn't you also receive them from Mr. Turrill?

A. Only as a repetition, some one or two days after, of a portion of the instructions.

X Q. 52. Why, then, did you seek to give the impression that the instructions came only from Mr. Curtis?

(Objected to as assuming that the witness sought to give any impression, which is not the fact.)

A. Because, receiving them from him in the first instance, I considered them as directly from him as counsel for the plaintiff.

X Q. 53. What did Mr. Turrill want of this information, if it was not for you to testify to?

(Objected to as incompetent.)

A. He said, I think it was the day I left, that they wanted to know the facts in the case in regard to patching rails on the line of that road, but did not state what use he intended to make of it.

X Q. 54. You expected, then, to be a witness in the case, did you not?

A. Not till after I returned.

X Q. 55. Was nothing said about you being a witness before you went away?

A. No, sir.

X Q. 56. What did he want of this information, if it was not to be used in that way?

A. He only stated that he wanted to learn what was being done there.

1842 X Q. 57. What did you suppose he wanted of it?

(Objected to as incompetent.)

A. Well, I didn't suppose anything about it. I merely carried out his instructions and got all the facts, as far as I could, in the matter in which he sent me on.

X Q. 58. Do you mean to swear, Mr. Ragland, that it never occurred to you that you were to be used as a witness?

A. Not in regard to this information that I might get on the line of that road, as I did not think the testimony by hearsay would be acceptable.

X Q. 59. You did think, then, about it, to that extent?

A. To that extent, yes.

X Q. 60. Do you mean to swear that you gave no thought as to what use was to be made of this information?

A. Yes, sir.

X Q. 61. How old are you?

A. I am 58 years of age.

X Q. 64. And have testified four times in this case, already?

A. I think so.

X Q. 65. And you call yourself an expert?

A. That I leave for others to judge.

X Q. 66. You have been examined as an expert in this case?

A. I believe so.

X Q. 67. And you have occupied positions of trust and responsibility at different times in your life?

A. I have.

X Q. 68. And you were selected by the plaintiff and his counsel as a fit person to go on this important and delicate mission?

A. I was selected by them. I suppose they thought me fit to get the information they required.

1843 X Q. 69. And yet you went without giving any thought to the use that was to be made of the information so acquired?

A. I did, excepting what I have stated before.

X Q. 70. When did you leave the Chicago & Alton Railroad as contractor, or after being contractor?

A. I think in the fore part of the month of May, somewheres about the first, 1865.

X Q. 71. How came you to leave?

A. I demanded from the superintendent, Mr. Hale, an advance of ten cents per rail, and he didn't know whether he could give it or not, and inquired my reason for making the demand. I replied that iron, fuel, labor, had advanced to such an extent that it did not leave me a fair compensation for my time, and I could not continue the contract without this advance.

X Q. 72. What were you getting a rail?

A. Eighty-five cents.

X Q. 73. What block did you use?

A. The one known as the Whitcomb pattern.

X Q. 74. Who did it belong to?

A. To me.

X Q. 75. How many of them?

A. I think I had seven.

X Q. 76. How long?

A. I think the jaws of the block ——

X Q. 77. I mean how long did you own them?

A. For about six years.

X Q. 78. Beginning when?

A. In '59—in the winter of '59.

X Q. 79. During that time you repaired many thousand rails, did you not?

A. I do not know the number of thousands, but some thousands.

X Q. 80. Was it not many thousands?

1844 A. Well, it was many, but I don't think the largest number of thousands.

X Q. 81. How many a day?

A. We average about 12 rails a day to a fire.

X Q 82. Eighty-four to the seven fires?

A. About that.

X Q. 83. Have you ever been sued by Mr. Turrill for infringement?

A. No, sir.

X Q. 84. Has he ever threatened to sue you?

A. There was something said to that effect at one time, some time ago.

X Q. 85. What was said?

A. He said he believed he'd have to sue me for royalty in using his patent block. I told him to go ahead and sue; for if he got a judgment I could beat him on the execution.

X Q. 86. When was that?

A. I think that was about '62 or '63—way back some time; I have no recollection what time; it may have been later than '63.

X Q. 87. What is this place at Bloomington you have been fixing up?

A. That is my former residence, dwelling, stable, grounds, etc., fences.

X Q. 88. Is it yours now?

A. No, sir.

X Q. 89. When did it cease to be?

A. I don't remember the date exactly.

X Q. 90. Year?

A. In the year—I think in '62 I first transferred it by giving a deed in fee simple on collateral security for a loan. Not having complied with the conditions of the deed, it passed out of my hands.

X Q. 91. When he threatened suit had you no property liable to execution?

1845 A. I had some wild lands in Iowa.

X Q. 92. Was that all?

A. About all my real estate.

X Q. 93. How was it about your personal property?

A. I think it was assessed at $800—about that.

X Q. 94. Its real value was much more, was it not?

A. Probably would have brought more.

X Q. 95. The real value was three or four times the assessed value, was it not?

A. Not four times.

X Q. 96. Has Mr. Turrill ever promised not to sue you for infringement?

A. No, sir.

X Q. 97. Has he not given you to understand that he would not?

A. There hasn't anything been said about it since he first threatened to sue me.

X Q. 98. Which is the harder, the rail or the patch?

A. In some instances the bars are the softest, in some the hardest.

X Q. 99. As a general rule, how is it?

A. Well, I think, as a general rule, railroad-bars made from puddled iron is harder than bar-iron.

X Q. 100. Are the rails generally made from puddled iron?

A. Some are made from a mixture of scrap and puddled iron; others are made from a mixture of old bars in connection with new iron; others rerolled entirely of old rails.

X Q. 101. What I ask you is, what are they generally made of?

A. I expect the largest amount of rail that is made at the present time is made of puddled, from the pig mixed with scrap.

1846 X Q. 102. How was it three or four years ago?

A. A very large amount of iron made by our furnaces, about here, at this and other places, were principally from rerolled iron, with some addition, in some cases, of new iron.

X Q. 103. Would those rails be harder or softer than the patch-iron?

A. The rerolled bars would be somewhat softer.

X Q. 104. Is a rerolled bar softer than one made from new iron?

A. That will depend upon whether it is common bar-iron or refined bar-iron.

X Q. 105. What has been the average mend per rail upon all the railroads that you have seen?

A. Well, as far as my recollection serves me, from eighteen to twenty-four inches; it may have exceeded that on some roads.

X Q. 106. That would make the average about twenty-one inches would it not?

A. Yes.

X Q. 107. Can you tell positively, from inspection, whether a rail has been mended upon the swage-block or Bain rolls?

A. I think I can.

X Q. 108. How long does a mended rail last, as a general thing?

A. That will depend on the traffic of the road and the weight of the machinery and engines, and the speed at which they run.

X Q. 109. How would it be on the Chicago & Alton?

A. I think in the main track, the other parts of the rail being good and sound, they would run from four to five years.

X Q. 110. Are you sure of that?

A. That is the best of my judgment in the matter.

1847. X Q. 111. Did you ever take note of a particular rail, to see how long it would last?

A. I did, at one time, with one rail.

X Q. 112. Where?

A. During the time I was at work at Chenoa.

X Q. 113. Where?

A. At Chenoa.

X Q. 114. What for?

A. For the purpose of learning how the patched rail would stand in connection with the new rerolled rail.

X Q. 115. What interest had you to know?

A. They were talking at that time that it was not profitable to patch rails, and the road-master at Chenoa, in that division, at my suggestion, put in two rails, one of the rerolled iron and one a patched rail, having 15 inches patch on each end. My object was to show that the patched iron, the rest of the bar being sound, would wear as long as a new rail.

X Q. 116. You were a patcher then, were you?

A. Yes, sir.

X Q. 117. Made your living at it?

A. Yes, sir.

X Q. 118. Your trade, then, was in danger if patching was given up?

A. In that branch of business, yes.

X Q. 119. Can you swear that all the pa'ches you measured on the Chicago & Alton were patched on the jaw block?

A. To the best of my judgment and knowledge of rail-patching, yes.

X Q. 120. Are you willing to swear to it positively?

A. As far as my judgment goes, yes.

X Q. 121. That is not the question. Please answer the question. (Question repeated.)

1848. A. I will swear positive, as far as I am capable of judging from my knowledge of patching rails.

X Q. 122. Then you cannot swear absolutely?

A. In no other language than the former answer.

X Q. 123. When you worked as contractor for the Chicago & Alton, what was the length of patches put on by you?

A. They varied from six inches to twelve; in some cases, sixteen and eighteen on each end, and in some cases on each end and in the middle.

X Q. 124. What was the length of the shortest mend you were in the habit of making?

A. I don't think I ever put a patch on less than four inches.

X Q. 125. What did you do with the rails that were shattered less than four inches?

A. In 'most all cases when a rail was exfoliated at all on the end, perhaps not showing more than one inch, we cut back to the solid iron, which, in some instances, was as low as four inches, and in other instances greater distances than that.

X Q. 126. What was the greatest length of mend that you were in the habit of putting on to a single rail under this contract?

A. In some cases as high as three feet; that is to say, in three places, a patch each end and a patch in the middle.

X Q. 127. What I want to get at is, the greatest length of a single mend.

A. 16 to 20 inches.

X Q. 128. What was the length of the greater number of mends then made by you?

A. I suppose the greater number of mends would run from fourteen to eighteen inches.

X Q. 129. How many mends did you average to a rail?

A. About two.

X Q. 130. Were there not a great many mends of about six or seven inches?

1849 A. There was a number of mends six to seven inches.

X Q. 131. Was there not a great many of them?

A. Not a very large number.

X Q. 132. Was there not a great many about ten inches?

A. There was a number about ten inches.

X Q. 133. Since you left the road have the mends been longer or shorter, or about the same?

A. I do not know only in one case.

X Q. 134. Did you ever work on the Bain rolls?

A. No, sir.

X Q. 135. Did you ever observe the operation of it?

A. Yes, sir.

X Q. 136. Were the patches longer or shorter than those put on with the swage-block, as a general thing?

A. I think they were a little longer, as a general thing.

X Q. 137. The rolls do the welding much more rapidly than the swage-block, do they not?

A. Yes, sir.

X Q. 138. What is the heat of melting iron; do you know the number of degrees?

A. I do not remember the precise number at the present time.

X Q. 139. Please state as nearly as you can.

A. I have no recollection, without reference to my books, on that subject.

X Q. 140. Can you state the difference between the heat of melting iron and the heat of welding iron?

(Objected to as incompetent.)

A. I cannot state the difference in latent heat.

X Q. 141. Do you know the heat or heats at which iron can be welded?

A. I do not know, never having measured it.

1850 X Q. 142. How, then, do you know that the jaws do not cool the rail sufficiently to affect the proper welding heat?

A. By daily experience and having the work done under my observation, never having had a heat spoiled after being put in the jaws before the patch was welded on; also the head of the rail being a thick body of iron and the fact of the jaws not coming up to the surface of the rail where the heat is taken, I don't think it is possible, under these circumstances, and the time being so very short between the clamping of the rail in the jaws and the laying on of the patch, to cool the rail on that part on which the patch is to be laid, to the extent of in any manner destroying, or partly destroying, the welding heat on the surface of the rail.

X Q. 143. How long does the rail remain in the jaws?

A. From the time the rail is clamped into the jaws until the patch is laid on will not exceed two seconds.

X Q. 144. Did you ever time it?

A. No, sir.

X Q. 145. How long is it before the welding is completed on the edges?

A. About two minutes from the time the patch is laid on until the weld is completed.

X Q. 146. Do you know how long it would take a piece of iron the size of a rail to lose its welding heat simply by being exposed to the air?

A. I never timed it.

X Q. 147. Iron is a very good conductor of heat, is it not?

A. It is so considered.

X Q. 148. You spoke of throwing water on the rolls in a rolling-mill; what is that for?

A. To keep the rolls cool.

X Q. 149. When doing what?

A. When passing the blooms through them.

1851 X. Q. 150. How large is the bloom or faggot?

A. I never measured one; don't know the exact length.

X Q. 151. About how large?

A. Well, I should judge, between four and five feet in length on looking at them, as near as I could judge it may be about that. I should judge the whole pile, when ready for the rolls, would be about five inches square.

X Q. 152. How long does it take that faggot to pass through the rolls?

A. I could not state, never having noted the time.

X Q. 153. You stated how long it took to get the patch on the rail, without having noted the time; why can you not do the same in this instance?

A. Because the time is too long passing the rail through the rolls to judge of the number of minutes without noting the time.

X Q. 154. Does it take a quarter of a minute for the faggot to pass through the first pair of rolls?

A. That would depend upon the speed with which the rolls were driven.

X Q. 155. Did you ever see the faggot pass through the rolls when it took a quarter of a minute?

A. I have seen them pass through the rolls, but never noticed the time it required.

X Q. 156. Don't you know, Mr. Ragland, as well as you know anything, that the faggot passes through the first pair of rolls in less than a quarter of a minute?

A. No, sir.

X Q. 157. Who sent you to Venice?

A. Well, I am not positive whether Mr. Turrill and Mr. Curtis were together at the time that they requested me to go to Venice; if so, the instructions was jointly from both parties.

X Q. 158. What instructions did you receive?

1852 A. To go to Venice; look over the tracks of the Chicago & Alton Railroad, in and about Venice Station; and, if found any patched rails, to measure the patches on the rails, and take a memorandum of the same; to have a competent man with me to assist in the measurement, and also to notice, and make note of what, if any, number of cut rails I found in the track.

X Q. 159. Did you know what use was intended to be made of that information?

A. I suspected it was to be used in this case.

X Q. 160. You did expect then, in this instance, to be examined as a witness, did you?

A. I don't think it was so stated to me; I think Mr. Curtis stated to me that he wanted to know what number of patched rails there were, and what was the length of patches, and how many cut rails there were not patched.

X Q. 161. The question is not what he stated, but what you expected.

A. Well, I have stated before what I expected. I expected to be examined in this case.

X Q. 162. You were not as innocent and unsuspecting, then, when you went to Venice, as when you went to Little Falls?

A. Well, if the counsel will define what he meant by innocence, I will try to answer the question. There may be more than one meaning.

X Q. 163. How near to the depot at Venice were these rails you say you measured?

A. Probably about a thousand feet—may be a little more than that, or about that.

X Q. 164. In what direction?

A. South, bearing west.

X Q. 165. Going from Venice toward what place?

A. The transfer yard.

X Q. 166. Were these rails all in one place?

A. No, sir.

1853 X Q. 167. Where were the others; what direction and distance from the depot?

A. They were in the various spur tracks in and about what is known as the transfer yard; the large number of them was in the transfer yard on the track, having both ends connected with the main track.

X Q. 168. On a siding or turn-out, was it; what you call a turn-out?

A. Well, it could not properly be called a siding on a main track.

X Q. 169. It was a part of the main track, was it?

A. No, sir; it was a track that belonged to the transfer yard especially.

X. Q. 170. To whom did that yard belong?

A. I learned from the agent of the transfer company that the ground was theirs, but the Chicago & Alton Railroad Company furnished all the material and iron and put in the tracks.

X Q. 171. You don't know, then, of your own knowledge, who it did belong to?

A. No, sir.

(Defendants object to all evidence regarding the ownership of that part of the track on the ground of hearsay.)

X Q. 172. What were these transfer yards used for?

A. As standing-room for cars and tracks to run cars off the Chicago & Alton line down on to the ferry-boat on which they were ferried over the river to St. Louis.

X Q. 173. Where is Venice; the further end of the road?

A. It is on the Illinois bottom; I don't know the county. It is about directly opposite, or nearly so, North Market street, in St. Louis City.

X Q. 174. Where is the terminus of the road?

A. On what is known as Bloody Island is the passenger depot—is, to the best of my knowledge, the terminus of that end of the road.

1854 X Q. 175. Is that at East St. Louis?

A. I think that is what they call it.

X Q. 176. Did you measure all the patches in those parts of the track?

A. Yes, sir.

X Q. 177. Are they all contained in the lists you have given us?

A. All that I measured are in that list. There was a track there that I was not positive whether it belonged to the Chicago and Alton Company or the Belleville Coal Company. I inquired of one of the agents there in the employ of the transfer company, and he could not tell me positively whether or not it was their track. For that reason I did not measure the iron in that track, although in passing along beside the track I saw by a cursory examination that some of the rails were patched.

X Q. 178. What was the total length of those parts of the track where you measured the rails?

A. Well, I didn't measure the length of them.

X Q. 179. State as near as you can.

A. I will state that I might approximate something near the two spur tracks, which would probably measure between six and eight hundred feet each, or thereabouts. The long track connected at each end was probably in the neighborhood of 1,500 feet, or thereabouts.

X Q. 180. We will now go to Springfield. State where the track in which were the rails you measured was situated there in reference to the depot.

A. The rails we measured at Springfield were in the side tracks, and some of the rails in what I would call the main track, or a track that appeared to be used more than the other side track. All the tracks there in which I measured the patches on the rails connected in some manner with the main tracks. They were north of the passenger depot. I think the first rail I measured was about one block; that is the distance

1855 between the two streets which the road crossed, which was north of the depot.

X Q. 181. How far off was the furthest rail you measured?

A. Probably about 1,200 or 1,500 feet from the depot, north.

X Q. 182. Did you measure all the patched rails there in those portions of the track?

A. All that was clear of cars I found in the different tracks.

X Q. 183. They are all contained in the list you gave yesterday?

A. Yes, sir.

X Q. 184. What was the total length of those portions of the track containing these rails you measured?

A. Including all the tracks that I measured rails in, somewhere in the neighborhood of twenty-five hundred feet.

X Q. 185. Where were the rails you measured at Bloomington; what distance from the depot and in what direction?

A. They were north of the depot about to the extent of between two and three thousand feet.

X Q. 186. Was that the distance of the nearest rail you measured?

A. I think the first rail I measured was about 300 feet, or about that—I don't know the exact number or length of the blocks there—north of the depot, at the corner of Washington street, at the point where the road crosses Washington street.

X Q. 187. How far was the farthest rail you measured from the depot?

A. I think between two and three thousand feet, or about that.

X Q. 188. What was the total length of track containing the rails you measured?

1856 A. As near as I can recollect without a measurement of the distance, putting all the tracks together in one continuous line, would make between four and five thousand feet.

X Q. 189. Did you measure all the patched rails in those portions of the track, and are they contained in the list you gave in yesterday?

A. I measured all the patched rails, excepting there may have been some in the side tracks, which were occupied by cars. They are contained in the list I gave you yesterday.

X Q. 190. Where were the rails you measured at Chenoa? How far were the nearest from the depot, and in what direction?

A. North of the depot; probably five hundred feet or more.

X Q. 191. How far was the farthest?

A. About five hundred feet; somewheres about that.

X Q. 192. What was the total length of those portions of the track containing the rails you measured?

A. Well, probably from a thousand to fifteen hundred feet, or thereabouts.

X Q. 193. Did you measure all the patched rails in those portions of the track?

A. I did, except that portion of the tracks occupied by cars.

X Q. 194. Are they contained in the list you gave us yesterday?

A. Yes, sir.

X Q. 195. You stated yesterday that the iron of the rail is much harder than the patch-iron. Is that true?

A. In some cases.

X Q. 196. You stated it yesterday as a general proposition. Is that correct?

A. Harder to bend, and not so ductile as the patch-iron; that was the answer yesterday.

1857 X Q. 197. Is that true?

A. In most cases, yes.

X Q. 198. The ductile iron is softer than the iron not so ductile, is it not?

A. Not in all cases.

X Q. 199. Well, as a general rule?

A. Refined iron is ductile and hard. Some commoner iron is softer and more ductile.

X Q. 200. When you mended iron for the Chicago & Alton by contract, what did you furnish?

A. I furnished everything appertaining to the business—shops, tools, furnaces, swage-blocks, fuel, fire-clay, fire-bricks, and labor and iron.

X Q. 201. What did the iron cost you?

A. I think I bought iron from 2¼ to 8 cents a pound. I think I paid 9 for some during the spring of '65.

X Q. 202. What did your fuel cost?

A. At Springfield, about 3 cents a bushel. At Chenoa, 'rom 17 to 46 cents. At Springfield I had a contract with the gas company to take all their coke.

X Q. 203. How many bushels a day?

A. At Springfield shop I have no account of the amount burned per day, as my brother attended to that shop and all that part of the business for me; at Chenoa, about eight to ten bushels a day.

X Q. 204. Did it ever cost you $4.60 a day for fuel?

A. It cost me 46 cents a bushel for Pittsburgh coke—that is, coke and transportation.

X Q. 205. Do you mean to say that it ever cost you $4.60 a day for fuel at one fire?

A. Yes, sir, during the war.

X Q. 206. How long a time?

A. I think I used that coke about three months.

X Q. 207. Was that the cheapest fuel you could get at that time?

1858 A. Yes, sir—that is, of coke. The parties that I formerly bought of in Peoria were not, for a short time, making any coke; I ordered coke from Pittsburgh.

X Q. 208. Was there no other fuel cheaper than that?

A. Not that I could use in a close furnace.

X Q. 209. How long did you use the common anvil?

A. I think we commenced on Tuesday or Wednesday of the week and finished out the week; either four days or about that; it may have been five.

X Q. 210. When was that?

A. I think that was in 1859.

X Q. 211. In using the common anvil did you bank up the fire so as to heat the crown of the rail without heating the neck?

A. We used the close furnace.

X Q. 212. That couldn't be done in the close furnace, could it—the banking up of the fire?

A. No, sir.

X Q. 213. Would there be any difficulty in doing it with an open fire?

A. With an open fire the fire can so be kept away from the neck of the rail so as not to heat the flange to any extent, but with a banked fire it would necessarily heat the rail all over.

X Q. 214. Could not the fire be so arranged as not to heat the neck to welding heat?

A. Yes, sir.

X Q. 215. How many rails did you average a day to each fire when you worked for the Chicago & Alton?

A. I think about twelve; in some cases less and in some more.

X Q. 216. What was the average length of mend per rail?

1859 A. Well, I will answer that by asking if you have reference to one continuous patch, or the amount of all the patches put on to a rail?

X. Q. 217. All the patches; the average amount of patching put on to a rail?

A. About eighteen inches.

X. Q. 218. You left the Chicago & Alton because they wouldn't pay you enough, as you thought, did you not?

A. Yes, sir.

X. Q. 219. Will you swear that your patches averaged eighteen inches to a rail?

A. I believe I am swearing under oath in making the statement now, and the answers to the other questions also.

X. Q. 220. Is that the best answer you can make to the question?

A. I will now answer that I am under oath when I say the patches averaged about eighteen inches to the rail.

X. Q. 221. Do you mean to say that you swear to that absolutely or according to your best judgment?

A. I mean to say that I swear to that to the best of my knowledge and judgment, without having measured all the patches.

X. Q. 222. Then you cannot swear positively that they averaged eighteen inches to the rail?

A. I cannot swear positively, as I never measured all the patches put on the rails.

X. Q. 223. Can you swear positively that they would average sixteen inches to the rail?

A. No more positive than I have in the foregoing answer.

X. Q. 224. Can you swear positively that they would average fourteen inches to the rail?

A. I will answer that question as I did the other.

X. Q. 225. Can you swear positively to twelve inches to the rail?

1860 A. No; not having measured all the patches.

X. Q. 226. How many rails did you average when working at Michigan City?

A. About ten rails per day at each fire.

A. Q. 227. Was that by contract or by day's work?

A. By contract.

X. Q. 228. How much were you paid?

A. The contract was not mine; I was employed to superintend the work.

A. Q. 229. Whose was the contract?

A. Mr. Alexander's.

X. Q. 230. How much was he paid?

A. He didn't inform me, sir.

X. Q. 231. Did you never know?

A. Not positively; no, sir.

X. Q. 232. Did you work at the fire yourself?

A. No, sir.

X. Q. 233. What was the average mend there, per rail?

A. About two feet.

X. Q. 234. How do you know?

A. Each separate patch was measured.

X. Q. 235. Who measured it?

A. The workmen, at my direction.

X. Q. 236. You didn't measure it yourself?

A. I did on some occasions.

X. Q. 237. How many fires were there?

A. Three.

X. Q. 238. If you didn't work at the fire, what did you do?

A. Superintend the work.

X. Q. 239. What did that include?

1861 A. To see that the men performed their labor, regulate their wages, see that proper material was kept furnished to keep them in work, tools were properly made, and such other general care as

I would give it were it my own contract; also, at the same time I was having constructed new swage-blocks, purchasing furnaces and other appliances to put up more fires on the line of the road, keep the men's time, pay them their wages, and at the end of each month return the voucher of the amount so paid to Mr. Alexander.

X Q. 240. With so much to do you couldn't have measured many of the patches. Is not that so?

A. At all times when I was there in the shop I measured the patches on the rails, as they were laid outside of the door, in order to learn if the men performed the amount of work required of each fire, during my absence; and further, because that account and copy of it had to be sent to the receiver of the road monthly, and I was held responsible to the receiver of the road, as also to Mr. Alexander, for the number of feet and inches patched per month.

X Q. 241. How many different roads have you visited with a view of ascertaining the amount of patching done per rail?

A. If my memory serves me right, eight different roads.

X Q. 242. Which roads?

A. The New York Central, the Cleveland & Erie Road—I am not positive about the name, it runs—it runs east from Cleveland. The Cleveland & Toledo, the Illinois Central, the Lake Shore & Michigan Southern, the Chicago & Alton, the Burlington & Quincy, at Aurora; the Chicago & Northwestern, at Turner Junction. I think that is about all the roads I have been on. There may have been another or so—some of them short branches.

X Q. 243. Was the average length of weld per rail the same on all these roads?

A. I took no note of the patching on any roads except the Lake Shore & Michigan Southern at Laporte, and the New York Cen-
1862 tral at Little Falls. The other roads I visited was for other purposes, in connection with this suit, excepting the Chicago & Alton Road, where I measured the patches the other day.

X Q. 244. What was the average length of patch per rail on each of the last roads you have named?

A. The New York Central Road, at Little Falls, the average length of patch, as measured by Mr. Lebart and myself, was five inches and fifty-five-hundredths. The length of patches on the Lake Shore & Michigan Southern Road, at that time called the Michigan Southern & Northern Indiana, that is at the time I measured the patches on the iron at their shops in Laporte, these rails had been patched, that I measured, and laid outside of, and along by, the shop, averaging two feet to the rail.

X Q. 245. Then you have no knowledge of the average length of weld on any other roads than those you have mentioned, have you?

A. No, sir; not by measurement.

X Q. 246. Did you know any more in 1870 than you know now?

A. There might have been things taking place at that time that up to the present time has passed from my memory.

X Q. 247. When was this measuring done by you at Laporte?

A. I think it was in '61, I think, or '62, I ain't sure which; it was about that time.

X Q. 248. How many rails did you then measure?

A. I don't recollect the number, and my memorandum that I took at that time has either been lost or mislaid. There was a considerable number of rails laid at the shop-door preparatory to being taken away to be laid in the tracks.

The further cross-examination of this witness is continued to Thursday, December 18th, 1873, at 10 o'clock a. m.

1863 THURSDAY, *December* 18, 1873—10 a. m.

Present as before, and John N. Jewett, of defendants' counsel.

Cross-examination resumed.

By Mr. PAYSON: We have got through.

Redirect examination by Mr. Curtis:

64. Q. You speak in your cross-examination of having been employed recently in this case for 37 days; state whether or not you have been waiting here a part of that time for your testimony to be taken.

A. I have been waiting here, expecting to be examined, but not called on.

65. Q. You were asked in cross-examination as to whether the rail or the patch-iron used in mending them is composed of the hardest iron. After the patch-iron has been heated and hammered with sledges, in welding it on to the rail, which is then the hardest?

A. When the patch-iron and the rail being nearly equal in hardness after the operation that the patch is put through in hammering and swaging and finishing up, the particles of the iron composing the patch becomes more firmer than the patch originally was, forcing the particles together and refining the iron, so that it would then be harder than that of which the rail is composed.

66. Q. About how many years would a patched rail last in the side-tracks of the Chicago & Alton Road, according to the best of your judgment?

A. I cannot state any definite time; it would depend mainly on the amount that the side-track was used.

67. Q. Such side-tracks as you recently examined—would the rails last much longer than in the main track, or not?

A. They would last a great deal longer than in the main track.

1864 68. Q. You mentioned a patched rail at Chenoa, laid down in connection with a new rerolled rail; how long did that patched rail last, and how did it wear in connection with the adjoining rerolled rail?

A. The rail was patched and laid down in the track at Chenoa; against it was put down a new rerolled rail. In about three months' time the rerolled rail became fractured on the end adjoining the patched rail. It was then taken out of the track and repaired, put back in the track again, with its end against the patched rail. The two rails then were left in the track until all parts of the old rail that was patched, and between the patches—the patches being at each end of the rail—that part not patched was entirely worn out, while the patches did not show any fracture, but appeared to be as firm as when first put in the track. The new rerolled rail that was adjoining against the patched rail—all that part of the rail that had not been patched became fractured in numerous places; the patched end, next the old patched rail, appeared to be as firm as when first put in the track.

Q. 69. What length of time, to your knowledge, as near as you can recall, did the rail you term the old patched rail remain down in the track?

A. About two and one-half years, as near as I can recollect; the exact time was not noted down.

Q. 70. Have you, or not, any doubt in your own mind that the patched rails you measured on the Alton Road were mended in the Whitcomb machine?

(Objected to by defendants as leading and incompetent.)

A. I have no doubt in my own mind but that I was correct in meas-

uring the patches on the line of the St. Louis Railroad, and that all patches so measured were put on with what is known as the Whitcomb machine.

Q. 71. You were asked, on cross-examination, about the tem-
1865 perature at which iron can be welded. State whether or not you know the heat at which iron can be properly welded when you see the iron in the furnace?

A. I know by the appearance of the iron—when in the furnace—when it has attained a welding heat. When the iron comes to a welding heat, and ready to be taken out to receive the patch, both the patch and rail-road-bar is heat up to the point where liquifaction commences on the surface of the iron. It is then at a welding heat.

Q. 72. Before measuring the rails at Venice, did you, or not, make careful efforts to ascertain the truth in regard to the ownership of the tracks where you measured rails?

(Objected to as leading and incompetent.)

A. I did make such efforts, by inquiring of Mr. Mitchell, the superintendent of the transfer yard; also, of Mr. Scanlan, one of the clerks in and about the yard, and measured the iron on such tracks, as I learned from them, belonged to the Chicago & Alton Railroad.

(Answer objected to as hearsay.)

Q. 73. You were asked yesterday whether you could swear positively, to use the expression made use of by respondent's counsel, that the rails you mended for the Alton Road averaged 18 inches per rail. Do you or not comprehend how any man can "swear positively" to an average unless he first added up all the mends, and divided by the number of rails?

A. I do comprehend that I could not swear positive unless I had so measured all the rails patched, and divided the number of rails by the number of inches—the number of inches by the number of rails I should have said, which in this case of average I did not do.

Q. 74. When you worked at Michigan City, and also when you worked for the Alton Road, did you, or not, mend all the rails you could get to mend from the respective companies?

1866 A. I did mend all the rails that I could get to the shop, both from the St. Louis company and the Louisville, New Albany & Chicago Railroad Company.

Recross-examination by Mr. Payson:

X Q. 249. After all your various statements on the matter, the defendants would be glad to know what your real opinion is as to the comparative hardness of the rail and the patch.

A. After the patch is put on the rail, thoroughly hammered down and swaged, my opinion is that it is harder and will stand more wear than the common railroad-bar-iron.

X Q. 250. Then the other parts of the patched rail, between the patches, would be softer, would they not?

A. The other parts between the patch, on the same rail, perhaps might be nearly or equally as hard as the patch, for the reason that the end of the rail being put into the fire and brought to a welding heat, and laid out, allowed to become cool by the temperature of the atmosphere, becomes annealed, the temper being taken out by the process of heating; and, when the iron is annealed at that-point, it m'y be some softer than in other parts of the rail.

X Q. 251. What has the annealing and softening of the end of the rail

to do with the comparative hardness or softness of the patch, and the rest of the rail?

A. I want to correct my previous answer before answering this question. Here I want to state, instead of equally as hard, or about equal in hardness or softness, either one or both; they are about equal, the patch and the other part of the rail.

X Q. 252. Your latest conclusion, then, on the subject, seems to be that the patch after it is put on is neither harder nor softer than the rest of the rail, is that it?

A. In some qualities of railroad-bar-iron; but in rerolled iron the patch is invariably the hardest.

X Q. 253. How is it with iron that has not been rerolled?

1867 A. The patch and the iron could be nearly equal in the case of iron made directly from the pig.

X. Q. 254. What was the rail made of that you have just spoken of as the old patched rail at Chenoa? Was it rerolled?

A. The old patched rail was old T rail, I think made before the rerolling commenced—a rail that has been in use in the track for a number of years before it was so patched. The rail that was placed against it was rerolled iron.

X. Q. 255. And consequently softer, was it?

A. And softer.

X. Q. 256. In the old rail the patches were the hardest part, were they not?

A. They were about equal in the hardness of the rail.

X. Q. 257. How then do you account for the fact that the other portions of the rail—the parts not mended—wore out the first?

A. Because it had been in use some six or seven years before being patched.

X. Q. 258. How do you account for the same fact in regard to the rerolled rail?

A. Because the rerolled rail was much softer than the patch, and showed a great many flaws at different parts of the rail when only a short time in use.

X. Q. 259. Do you consider it, then, a fair test to put this soft rerolled rail against the harder rail?

A. I consider it so; a fair test as regards old rails that have been used six or seven years in the track and then patched without showing a fracture on the patch; at the same time the rerolled rail or new rail not wearing as long as the old rail, in my mind showing a fair conclusion that it was profitable to patch iron.

X. Q. 260. How do you know that old rail had been six years in the track before it had been patched?

1868 A. I was acquainted with and knew the character of all the original iron laid on the Chicago & Mississippi Road, so called at that time, and know that, from its formation, to be one of the original rails that were first put in the track when the road was built.

X. Q. 261. When was that?

A. The road was built in '53, or rather the iron was laid in '53 and '54.

X. Q. 262. When was the experiment of yours tried?

A. I am not positive of it to a year, but in '61 or '62.

X. Q. 263. The rail then had been down eight or nine years, had it?

A. No, sir; that part of the track that the rail in question came off, was laid in the summer of '54.

X. Q. 264. How do you know?

A. I happened to run the first engine over the road after the tracks

were put down, and I think it was about that time. I was at that time superintendent of machinery and rolling-stock of the road.

X. Q. 265. What part of the road was that?

A. That was between Lexington and Chenoa, on the division of a man by the name of William Harding.

X. Q. 266. How do you know this rail came from that part of the track?

A. At the time I made this experiment Mr. Harding was bringing rails in off of his division to the shop to be repaired. This was one of his rails and put in the track again on his division.

X. Q. 267. Did it come from the main-track, or side-track, or spur-track?

A. Come out of the main-track.

X. Q. 268. How do you know?

A. I know from the road-master, as he usually told me where he was in most need of the iron, and in somewhat of a hurry to get it
1869 back into the track, as the road at that time, or the iron rather, was in most places in a dilapidated condition.

X Q. 269. Do you remember, after this lapse of time, what he told you about that specific rail?

A. I do, from the fact that I was interested in keeping the iron, or rather, I should have stated, keeping the contract I then had to patch iron for the Chicago & Alton Company.

X Q. 270. Do you know that the rail had been in use all that time?

A. I do not know positively; I didn't see it every day, that or any other particular rail.

X Q. 271. What was the condition of the other parts of the rail besides those you patched?

A. Apparently sound, but considerably worn.

X Q. 272. You were unable to swear yesterday that the patches you measured on the Alton Road were done on the jaw-block. Are you any better able to swear to it to-day? If so, why?

A. I swore yesterday that the patches I measured on the Chicago & Alton Railroad, to the best of my knowledge and experience in patching iron, they were mended on what is known as the Whitcomb block, and as I did not see them so mended, I will swear now I cannot be any more positive than I was yesterday.

FRIDAY, *December 18th.*

WM. T. RAGLAND recalled by consent of counsel.

By Mr. Curtis:

Q. 75. Please state, if you can do so from your own personal knowledge and observation, whether or not, during the period of your contract with the Alton Road, that company were themselves mending any rails on the Whitcomb machine, at Summit, and whether you had any interest in the work there, under your contract.

1870 A. I did see them mending rails at the Summit, on several occasions during the existence of my contract on the Chicago & Alton Road. The blocks used were similar in construction to the one I used at Chenoa, known as the Whitcomb pattern. I had no interest, nor in any way connected with the shops where they repaired rails at the Summit.

Recross-examination by Mr. Payson:

X Q. 273. When did you see them mending rails at the Summit?

A. I cannot state the precise date or year, but during the time of the existence of my contract I saw them so mending rails there.

X Q. 274. How often?

A. Well, perhaps as many as half a dozen times. I never gave it anything but a cursory examination.

X Q. 275. Was it half a dozen times?

A. I think as many as that.

X Q. 276. You can't swear to it, can you?

A. Not positively to the number of times.

X Q. 277. Can you swear to five times?

A. I will not swear to any particular number of times, as I did not take down the times, dates, nor anything connected with it, having no interest there other than curiosity.

X Q. 278. When did your contract with the Alton Road begin and when did it end?

A. I commenced as a silent partner about '58. I took the contract in my own name in '59 or '60, not quite sure which, and continued it in that manner in my own name up to '65, some time in May.

X Q. 279. What did you do the year after your contract ended?

A. I was for a time connected with a small ale-brewery in Bloomington, directly after leaving my contract with the Chicago & Alton Railroad Company.

1871 X Q. 280. How long did you run that brewery?

A. Up to some time in '67.

X Q. 281. When did you see this mending you speak of; during the first part of your contract or the last?

A. During the last part of my contract.

X Q. 282. In the year '65?

A. And before that.

X Q. 283. How long before?

A. I cannot state the exact year, as I have no memorandum of it.

X Q. 284. Can you swear that you saw them mending rails at the Summit in the year 1864?

A. I cannot, any further than I have before stated.

X Q. 285. How many fires had they at that shop altogether at that time?

A. I did not notice but one in operation. I think there was two there.

X Q. 286. What were they doing to the rail?

A. Welding on patches.

X Q. 287. How long did you stay in the shop?

A. Probably half an hour the longest time—about that.

X Q. 288. What were you there for?

A. No particular purpose. I see these operations of patching mostly during times that I was passing over the road and delayed there some minutes in the train in which I was riding. I am not positive that I ever went there at any time for the purpose of examining, though I may have done so.

X Q. 289. Did you know any of the men at work on the rails?

A. I had no acquaintance with any of the men in the shop.

X Q. 290. Can you name any one of them now?

A. I cannot name any person that worked there at the shop.

1872 X Q. 291. Was your contract with the company to repair all the rails, or what was it?

A. My contract did not express that I was to mend more or less rails. I think, if my memory serves me right, the writing was to the effect simply that I should have eighty-five cents a rail for patching iron.

X Q. 292. Where did you mend rails at that time?

A. At Bloomington and Springfield.

X Q. 293. How near was the nearest place to the Summit?

A. I don't remember the distance exactly—nigh about ninety miles.

X Q. 294. Did you say anything to any of the officers of the company about that mending at the Summit?

A. Not to my recollection.

X Q. 295. Why not?

A. Because I did not consider it concerned me.

X Q. 296. Didn't it concern you to mend all the rails you could get?

A. It was my interest to do so, though my contract did not oblige them to send me all their rails.

X Q. 297. If you had supposed they were mending any great number of rails at the Summit, wouldn't you have spoken to the officers about t?

A. I would not.

X Q. 298. You didn't care, then, whether you mended more rails or less?

A. I would rather mend more than less.

X Q. 299. Why hasn't this thing turned up before?

A. I have no knowledge of the reason.

Previous to signing his testimony the witness desires to make the following changes or additions:

On page 88, cross-int. 215, the answer is: "I think about twelve;" I wish to add, "in some cases less, and in some cases as many as twenty."

1873 On page 60, cross-int. 81, I answer: "Average twelve rails a day to a fire." I wish to add, "and frequently up to twenty rails a day to a fire."

By Mr. PAYSON: These are the only corrections you wish to make?

A. All the ones I notice, sir.

W. T. RAGLAND.

THURSDAY, *December* 18, 1873.

Present, Walter Curtis, esq., of counsel for complainant, the complainant in person; John N. Jewett, John B. Niles, and George S. Payson, esqs., of counsel for defendants, and the witness below named.

THOMAS M. RIPPON.

Q. 1. Please state your name, age, residence, and occupation.

A. Thomas M. Rippon; age, 46; residence, Springfield, Ill.; occupation, commission-merchant.

Q. 2. What was your former trade, Mr. Rippon, and how long did you work at it?

A. My former trade was a machinist. I worked at it about 24 or 25 years.

Q. 3. In your business as machinist, did you or not have much to do with welding of iron?

A. Constantly.

Q. 4. Have you ever been in the railroad-shops at Springfield where rails are repaired?

A. I have, but I never see rails patched to my knowledge.

Q. 5. State whether or not you recently visited Venice, Illinois. If so, when, with whom, and for what purpose?

A. I visited Venice, in Illinois, on the 1st day of December, in com-

pany with Mr. Ragland, to see to the measuring of certain patches on railroad-iron.

1874 Q. 6. Please state fully what you did while you were there with reference to the work for which you say you went there.

A. I saw Mr. Ragland measure rails there, and kept account of the measurement took by him in my presence.

Q. 7. Did you or not take notice whether the measurements were accurately made?

A. I did, and kept account of same.

Q. 8. How were the measurements made?

A. By placing a two-foot rule on the pieces so welded on the rail.

Q. 9. You may state, if you please, the measurements which you yourself saw made of the patches found on those rails, and for this purpose you may refer to any memorandum you may have, made by you at the time.

A. I found the following patches at Venice, as follows:

1 rail had a patch in the middle of 24 inches, and a 16-inch patch at the end.

1 rail 27½ inches in the middle, 13½ inches at the end.
1 rail 19½ inches at the end.
1 " 18½ " " " " and 17 at the other.
1 " 16½ " " " " " 19 " " "
1 " 15 " " " " " 16 " " "
1 " 15 " " " "
1 " 16 " " " " " 18 " " "
1 " 16 " " " " " 18½ " " "
1 " 13 " " " " " 19½ " " "
1 " 15½ " " one " " 17½ " " "
1 " 15 " " the " " 16 " " "
1 " 16½ " " one " " 17 " " "
1 " 18 " " the " " 12 " " "
1 " 3½ " " one "
1 " 18½ " " " " and 20 at the other.
1 " 30½ " in the middle.
1 " 13 " at the end.

1875 1 rail 4 inches at one end.
1 " 20½ " " " "
1 " 23 " " " "
1 " 18 " " " "
1 " 15½ " " " " and 22 at the other.
1 " 18 " " " "
1 " 7 " " " "

Being 25 rails in all.

Q. 10. With what degree of care and accuracy were these measurements made?

A. As before stated, by a two-foot rule. I saw the measurement took accurately.

Q. 11. State whether or not you afterwards proceeded to any other points on the line of the same road for the same purposes, and if so, what you did at each of those points.

A. On the 2d day of December, at Springfield, Illinois, we took measurements there of patches on railroad-iron, Mr. Ragland and myself.

Q. 12. Give the measurements, if you please, as before.

A. One rail, 14½ inches, patch at the end.
1 rail 20 inches at the end.

1 " 27½ " in the middle, 20 inches at the end.
1 " 23 " " " 16 " " "
1 " 25 " " " 16½ " one "
21½ at the other.
1 " 21 " at the end, 6½ at the other end.
1 " 23 " " " 19 " "
1 " 20½ " in the middle, 9½ at one end.
1 " 22 " " " 13½ " "
1 " 26 " " " 18½ " "
1 " 18 " at one end.
1 " 25½ " in the middle, 16½ at the end.
1 " 19 " at one end, 21 at the other.
1 " 21 " in the middle, 13 one end, 24 the other.
1 " 48 " at the end.
1876 1 rail 44½ inches in the middle, 12 inches at the end.
1 " 10½ " " " " 16 " "
1 " 7 " at the end.
Making 18 rails.

Q. 13. Please answer the same questions as to any other points you visited, if any.

A. December the 5th, 1873, at Bloomington, we found the following rails, with patches on them:

1 rail 22 inches in the middle, 13 at one end.
1 " 20 " " "
1 " 20 " " "
1 " 46 " " "
1 " 17 " at the end.
1 " 20 " in the middle.
1 " 5 " " "
1 " 21 " " "
1 " 12 " " " 14 at one end.
1 " 13 " at one end.
1 " 23 " in the middle, 14 at one end,
1 " 12 " " "
1 " 5 " at one end.
1 " 16 " in the middle, 9 at one end.
1 " 13 " at one end.
1 " 9 " " "
1 " 12 " " "
1 " 23 " in the middle, 13 one end, 19 at other.
1 " 22 " " " 10 inch one end.
1 " 7 " at the end.
1 " 8 " " "
1 " 9 " " "
1 " 14 " " "
1 " 14 " " "
1 " 23 " in the middle, 15 inches at one end.
1 " 11 " at one end.
1 " two middle patches; one was 22 inches, the other 20, and a 14-inch patch at the end.
1877 1 rail, 26 inches in the middle, 14 at the end.
1 " 24 " " " 12 " "
1 rail, 24 inches in the middle, 13 at the end.
1 " 18 " " " 16 " " 13 at other.
1 " 10 " at one end.
Making 32 rails.

Q. 14. What was the total number of rails you measured at all these points, and what was the average length patched per rail?

A. There was seventy-five rails. I make the average length patched 27 and 13 one-hundredths.

Q. 15. State with what care and accuracy the measurements were made at Springfield and Bloomington, as compared with those at Venice.

A. We made the same accuracy there; in fact, at all points they was accurately measured.

Q. 16. State whether or not you measured all the rails you found at those places which showed evidence of having iron welded upon them.

A. We measured them, all we found.

Q. 17. Please state from what point to what point on the rail you measured.

A. An end-patch we measured from the scarf to the end; middle-patches from one scarf to the other scarf, and end of same patch or patches.

Cross-examination waived.

THOS. MITCHELL RIPPON.

1878 THURSDAY, *December 18th*, 1873.

Present: Walter Curtis, esq., of counsel for complainant; the complainant in person; John N. Jewett and George Payson, esqs., of counsel for defendants, and the witness below named.

GEORGE LOUNSBERY.

Q. 1. Please state your name, age, residence, and occupation.

A. George Lounsbery; age, 38; residence, Chenoa; occupation, hotel-keeper.

Q. 2. What trade have you previously followed, and for how long?

A. I followed blacksmithing for 22 years.

Q. 3. State whether or not you frequently visited the railroad repair-shop at Chenoa, and have seen rails patched there.

A. I have quite frequently.

Q. 4. State whether or not you have recently taken part in the measuring of any patches on the rails of the Chicago & Alton Road; if so, when, where, and with whom?

A. Yes, sir, I have; December 14th, 1873, at Chenoa, at the north side of the depot, north of the depot, with Maj. Ragland.

Q. 5. Describe the manner in which the measures were taken, and state the degree of care and accuracy.

A. We measured the patches from the point of the scarf to the end of the rail with a two-foot rule; we were very particular in getting the right length.

Q. 6. What part did you yourself take?

A. I done the measuring.

Q. 7. How many rails did you measure?

A. Twenty-eight.

Q. 8. Did you measure any middle patches as well as end patches, or did you not?

A. I believe there was one middle patch.

1879 Q. 9. In what manner did you measure that middle patch?

A. From one point of the scarf to the other.

Q. 10. Please state the measurements of the patches upon those twenty-eight rails, referring for the purpose to any memorandum you made at the time, if you have any.

A. I haven't got the length of the patches separately.

Q. 11. My inquiry called for the length of the mends upon each rail without reference to the number of patches of which the mend is made up.

A. 1 rail, 20½ inches; 1 rail, 31 inches.
1 " 20 " 1 " 20 "
1 " 24 " 1 " 24 "
1 " 20½ " 1 " 19¾ "
1 " 17½ " 1 " 13 "
1 " 21 " 1 " 31 "
1 " 26 " 1 " 24 "
1 " 21 " 1 " 28½ "
1 " 21 " 1 " 14½ "
1 " 22¾ " 1 " 17½ "
1 " 31 " 1 " 26 "
1 " 21 " 1 " 13 "
1 " 12 " 1 " 17 "
1 " 11 " 1 " 17 "

Q. 12. If you have added up to ascertain the total number of inches, you will please state it; and, also, the average number of inches per rail, if you have ascertained it.

A. Number of inches patched is 585½, making an average of about 20 inches and 90-100 to the rail, I think it is, if I have figured accurately.

Q. 13. In what tracks were these rails?

A. They were in the side tracks, north of the depot.

Q. 14. Did you measure all the rails you saw in those side tracks in which these rails were found, which bore evidence of having had iron welded upon them?

1880 A. I did not; there were cars standing on a portion of the rails.

Q. 15. Did you measure all you found, except where cars were standing on the tracks?

A. I think I did.

Q. 16. Was there any difficulty in distinguishing a rail on which a a patch had been welded, from one which has not been patched, when the rail is clear and clean?

A. There is not, sir.

(Cross-examination waived.)

GEORGE LOUNSBERY.

FRIDAY, *Dec.* 19, 1873.

Present: Walter Curtis, esq., of counsel for complainant; the complainant in person; John B. Niles and George Payson, esqrs., of counsel for defendants, and the witnesses below named.

WILLIAM FLYNN.

Q. 1. Please state your name, age, residence, and occupation.

A. William Flynn; age, 45; residence, Springfield; work in the rolling-mill.

Q. 2. State whether you have ever worked at patching rails; and, if so, for whom you have worked at that occupation, and how long, and where.

A. I have, sir, in Springfield, for the Alton and Chicago and St. Louis Company, for about ten months, in Springfield; I worked eleven months in Bloomington for the same company.

Q. 3. Besides the times and places you have mentioned in your last

answer, did you or not also work as a helper at mending rails; and, if so, how long and where?

A. Yes, sir, I did, as helper at mending rails, in Springfield, for about four years, I guess, as near as I can come to it.

1881 Q. 4. What sort of machines were used in patching the rails, both when you worked as helper and when you worked in charge of the fires; were they the same as the models Exhibit A, E. B. G., notary public, and Exhibit Whitcomb machine, now before you, or not?

A. The Exhibit A is the kind of a machine they used when I helped, and this one (Whitcomb machine) I had charge of at the fire for a while.

Q. 5. Please tell us how these machines were used, and how they were placed, in reference to the furnace in which the rails were heated. In answering this question I want you to describe how you went to work and mended a rail.

A. Well, the machine was about, as near as I can come, about six or eight feet from the furnace, right square in front of the furnace, as square as it could be placed. Well, first fetched the rail in, and put it upon the block at one end, and the other man being at the other end, to what we used to called a crane. Then we put it in the fire, the end of the rail, and heated it; then brought it out and put it into this machine and scarfed it, and then put it back in the furnace again, and then took a welding heat on it and fetched it out in this machine and put on the piece.

Q. 6. About how long a time should you say the rail remained in the jaws while the patch was being welded down on to it?

A. About a minute or two.

Q. 7. State whether or not you ever found any difficulty in consequence of the jaws cooling the head of the rail before the patch could be solidly welded down on to it?

A. I never found no difficulty.

Q. 8. While you worked at mending rails, what parts of the rails did you used to put patches on to? I refer to your work at both Springfield and Bloomington.

A. Well, generally the both ends was what we put the most patches on.

1882 Q. 9. Did you, or not, patch any in the centers, or between the ends?

A. Yes, sir; plenty.

Q. 10. Did you, or not, patch any at both ends and in the centers, and between the ends also, on the same rail?

A. Yes, sir; I have.

Q. 11. State, if you know, how long middle patches you ever put on.

A. The longest middle patch I ever put on was four feet and eight inches.

Q. 12. Did you measure it?

A. Yes, sir.

Q. 13. Have you ever seen middle patches put on by other workmen as long as that one?

A. Yes, sir; some longer.

Q. 14. Where, and who put them on?

A. William Costigan and James Flavan, in Bloomington and Springfield both.

Q. 15. Did you mend any rails on the flange?

A. Yes, sir; several.

Q. 16. Did you see others mend rails on the flange?

A. Yes, sir.

Q. 17. Do you, or not, remember to have seen a rail mended on a flange which did not have to be mended also on the top or tread of the rail?

A. No.

Q. 18. Do you know what is meant by the term "Dutchman?"

A. Yes, sir.

Q. 19. Did you put in any of them?

A. Yes, sir; one.

Q. 20. When the rail was broken down only a little at the end, what did you usually do to it?

1883 A. When it was broken down a little at the end we generally put a small patch on.

Q. 21. Who was foreman of the shop at Springfield while you worked there?

A. William Costigan, William Crow, and Aleck Snodgrass.

Q. 22. Who were road-masters while you were there?

A. Couse—I can't give his given name—and Jerry Quaid.

Q. 23. Any one else?

A. No, sir.

Q. 24. Was Huskinson a road-master while you worked there?

A. Yes, sir.

Q. 25. Was Lee also a road-master while you worked there?

A. Yes, sir.

Q. 26. State whether or not, while you worked at Springfield, you had any orders, either from the foreman or road-master, in regard to the length of patch you should put on the rail.

A. Yes, sir; sometimes.

Q. 27. What orders did you get?

A. Well, I got orders if a rail wanted from a foot to two feet to put it on.

Q. 28. Did you or not get any orders to put on no more than you could put on at one heat?

A. No, sir.

Q. 29. Was the iron weighed while you worked at Springfield?

A. I never seen it weighed.

Q. 30. Were there any scales in the shop at Springfield on which the patch-iron could be weighed?

A. I never see none.

1884 Q. 31. Did you keep any account at Springfield of the iron used in patching rails?

A. No, sir.

Q. 32. How long should you say the mends or patches were, on the average, to the rail?

A. About sixteen inches.

Q. 33. Do you know how many inches you could and did put on at one heat?

A. Yes, sir; about twelve inches.

Q. 34. What is the most you ever put on at one heat?

A. I put on sixteen inches.

Q. 35. How often did the road-masters used to come to the shop at Springfield, and how long did they used to stay there?

A. Sometimes once a day, and sometimes twice a day; sometimes they wouldn't come at all in the day; would stay sometimes half an hour, and sometimes less.

Q. 36. About how many rails did you used to turn out a day, to the fire?

A. Well, about fifteen.

Q. 37. How many did you ever turn out in a day?

A. I turned out thirty (30).

Q. 38. Did you report the number of rails you mended each day?

A. Yes, sir.

Q. 39. Did you report anything but the number of rails at Springfield?

A. No, sir.

Q. 40. Did you cut off any rails at Springfield?

A. Yes, sir.

Q. 41. Was it, or not, common to mend one end of a rail which you cut off at the other?

A. No, sir.

1885 Q. 42. Where a rail was broken down badly at one end, did you, or not, sometimes cut it off at that end and repair it in the center or at the other end?

A. Yes, sir; I have.

Q. 43. What sort of rails did you cut off at Springfield—I mean what was their condition?

A. Rails that couldn't be mended.

Q. 44. When you worked at Bloomington, how was the work you did then—about the same as that you did at Springfield, or not?

A. I guess I put more iron to a rail in Bloomington than I did in Springfield, to the best of my opinion.

Q. 45. Who were road-masters while you worked at Bloomington?

A. Thomas White.

Q. 46. Did he require more work done on the rails than the road-masters had at Springfield, or less?

A. He required more, sir.

Q. 47. What instructions, if any, did he give you about mending your rails there? What did he tell you you were to do about it?

A. Well, if a rail wanted from three to four feet he made you put it on with a patch.

Q. 48. At Bloomington, did you keep an account of the patch-iron you used, and put that on the slate, as well as the number of rails?

A. Yes, sir, I did.

Q. 49. How many inches of patch-iron did you use a day on an average?

A. Well, from 270 inches to 300 inches.

Q. 50. What was the thickness and width of the patch-iron you used at Bloomington?

A. Well, it averaged from half an inch and five-eighths and up to an inch; the width about three inches, I guess.

Q. 51. Did you cut off any rails at Bloomington?

1886 A. Yes, when I got orders.

Q. 52. When did you used to get orders, and what sort of orders did you get?

A. When the road-master wanted a rail cut to such a length, or the foreman of the section, I cut it whatever length they wanted it.

Q. 53. State whether you got orders of the same sort before cutting the rails at Springfield.

A. Yes.

Q. 55. Can you state how many rails, or what share of the whole number of rails you worked on at Springfield, and also at Bloomington, were cut off and not mended at all?

A. I couldn't tell; mighty few were cut off and not welded at all, that

ever I done. I often put a foot of a patch on a rail, and cut off first that which couldn't be welded.

Q. 56. Please explain just what you mean by your last answer.

A. I cut off a piece of the rail, and then put a patch on the rail afterwards, at the same end.

Q. 57. Why are you unable to tell us the number or share of the whole number of rails you worked on you cut off and didn't mend at all?

A. I couldn't exactly say, but they were the fewest number.

Q. 58. Did you ever keep any accounts?

A. No, sir.

Q. 59. Have you any means from the way the work went on to help your memory about it?

A. No, sir.

Q. 60. Was there or not anything in the way the work went on to help any man's memory about it and guide him now in answering such a question?

A. I don't understand that, sir.

1887 Q. 61. Was there anything kept or done in the shop about the cutting rails by which the number could be fixed or nearly fixed, as to what rails were cut off and not mended at all?

A. I don't know, sir.

Q. 62. Did any of the other men working at the fires keep an account of the number cut, on the slate, separate from those that were mended?

A. No, sir, not that I know of.

Q. 63. Was the patch-iron weighed at Bloomington or only measured?

A. We measured it when we put it on the rail.

Q. 64. Did you or not used to set down the measurements each day on the slate?

A. Yes, sir.

Q. 65. What wages did you receive as helper, and what while you were in charge of the fire at Springfield?

A. When I went helping first I got a dollar and a quarter a day, and was raised from that to two dollars; and then when I was running the furnace I got two dollars and a half in Springfield.

Q. 66. What wages did you get at Bloomington?

A. Three dollars a day.

Q. 67. Before you worked for the company at Springfield, did you or not work as helper for a time while Major Ragland had the contract?

A. Yes, sir; he was the first man I went to work for.

Q. 68. While you worked at Springfield for the company, did you see any frogs made in the shop?

A. Yes, sir.

Q. 69. Who made them?

A. William Costigan.

Q. 70. Anybody else make any?

A. Not that I seen, for the company.

Q. 71. Was Alexander Snodgrass there at the time these frogs were made?

1888 A. Well, I couldn't tell whether he was or not.

Q. 72. Was their ever any complaint about the patches scaling off, and were any rails sent back to the shops for this reason or not?

A. Yes, I heard a complaint once.

Q. 73. Where, and who from, and what was it?

A. Well, he was section boss; he said a patch came off on his section.

Q. 74. Was that the only one you remember?
A. Yes, sir.

Cross-examination by Mr. Payson:

X Q. 1. Do you know the weight of the scrap-iron you used for patching?
A. I didn't use no scrap-iron in patching.
X Q. 2. What did you use?
A. I used what we called patching-iron.
X Q. 3. Do you know how much that would weigh per foot?
A. No, sir.
X Q. 4. In w at form did that iron come to the shop?
A. Well, different forms, some 15 feet long, and from there to 10 feet; it would be sometimes 20 feet in the bar.
X Q. 5. How many of these bars came at one time?
A. I don't know, sir.
X Q. 6. Who sent those bars to the shop?
A. I expect the road-master.
X Q. 7. At whose request?
A. Well, I don't know; we never wanted for iron while I worked there.
X Q. 8. The road-master always kept you supplied, did he?
1889 (Objected to; the witness h as not stated the road master kept them supplied.)
A. I expect he was the man that sent us the patching iron.
X Q. 9. He kept the account of it, didn't he?
A. I expect so.
X Q. 10. Who kept the accounts in your shop of rails mended?
A. James Flavan.
X Q. 11. Didn't you keep the accounts?
A. I kept a daily account in Bloomington, but never in Springfield.
X Q. 12. What did you keep that account on?
A. On patching iron.
X Q. 13. What I mean is, did you keep it on paper or a slate?
A. On a slate.
X Q. 14. What did that account include?
A. I don't know what that means.
X Q. 15. You don't know what the word include means; is that the trouble?
A. Yes, sir.
X Q. 16. What did you put down on this slate?
A. I put down the number of iron I used.
X Q. 17. The number of iron; do you mean the number of inches?
A. Yes, sir.
X Q. 18. Anything else?
A. Yes, sir; sometimes keeping an account of what rails we'd do.
X Q. 19. Sometimes, but not always?
A. Well, frequently.
X Q. 20. What was done with that account on the slate?
1890 A. The foreman took it off the slate every night and put it on his book.
X Q. 21. And did he then make copies from his b ook for the road-master?
A. Yes, sir.
X Q. 22. Did you ever see any of those copies?
A. No, sir.
X Q. 23. Do you know whether they were on printed sheets of paper?

(Objected to; the witness has just answered he never saw any.)

A. I don't know, sir.

X Q. 24. Don't this account on the slate show the number of pounds of patch-iron used?

A. No, sir.

X Q. 25. If a man knew the weight of the iron per foot, could he easily tell how many pounds had been used from that slate?

A. I expect he could.

X Q. 26. How long is it since you last worked for the company?

A. '67, to the best of my opinion.

X Q. 27. Where was that?

A. In Bloomington.

X Q. 28. Were you helper there, or blacksmith?

A. I was blacksmith there.

X Q. 29. How came you to leave their employ?

A. The work runned out.

X Q. 30. You mean they stopped mending rails?

A. No, not then they didn't; they could get along with one fire.

X Q. 31. You mean then, Mr. Flynn, that they didn't mend so many rails as they had been mending, do you?

A. I do, sir.

1891 X Q. 32. What do you understand by the word average?

A. The word average, what it would average? I understand by the word average that you might do a little more yesterday than to-day, and yet at the end of the month do as much taking one day with another.

X Q. 33. You knew James Flavan, didn't you?

A. Yes, sir.

X Q. 34. Have you anything against him?

A. No, sir.

X Q. 35. Would you believe what he might say?

A. I don't know about that.

X Q. 36. Do you mean you wouldn't believe him?

A. No, sir.

X Q. 37. Do you know Wm. Huskinson?

A. No, I don't know any man of that name. I know Bill Huskinson, of course, road-master.

X Q. 38. Well, that is the man I mean. He was road-master when you were working at Springfield, was it, or Bloomington?

A. When I worked in Springfield, sir.

X Q. 39. Would you believe him on oath?

A. Well, I don't know.

X Q. 40. Why not?

A. I don't know, sir.

X Q. 41. Do you know anything against him?

A. No, sir.

X Q. 42. Did you know William P. Lee?

A. Yes, sir.

X Q. 43. When?

A. Oh, in 1866.

X Q. 44. Was he road-master at that time?

A. Yes, sir.

X Q. 45. Would you believe the statement of Mr. Lee?

A. I don't know much about the man.

1892 X Q. 46. Do you know much about any of these men whose names I have mentioned?

A. No, sir.

X Q. 47. Didn't you work in the same shop with Flavan?
A. Yes, sir.
X Q. 48. At the same fire?
A. No, sir.
X Q. 49. How well did you know him?
A. I knowed him while I worked there in Bloomington.
X Q. 50. How well did you know him?
A. Not very well.
X Q. 51. He worked at one fire and you at the other in the same shop?
A. Yes, sir.
X Q. 52. Did you do any more work at your fire than he did at his?
A. No, sir.
X Q. 53. Did you have the same kind of rails to mend that he did?
A. Yes, sir.
X Q. 54. Did you mend them in about the same way?
A. Yes, sir.
X Q. 55. Flavan says that one hundred and twenty inches of welding would be a big day's work. Is that about what you would make it?
A. No, sir.
X Q. 56. What would you call a big day's work?
A. Three hundred inches.
X Q. 57. Did you ever do that amount yourself?
A. I couldn't exactly tell, sir.
X Q. 58. What is the most you ever did yourself?
A. Between 270 and 280.
1893 X Q. 59. When was that?
A. In '67.
X Q. 60. How came you to do that amount in one day?
A. Sometimes we used to have a better material of coke—used to work clearer in the fire.
X Q. 61. Was there any difference in the rails?
A. Yes, sir.
X Q. 62. What difference?
A. There were some T-rails and some fish-backs.
X Q. 63. Were the patches long or short that day?
A. The patches was long that day.
X Q. 64. Can you do more or less when the patches are long?
A. I can put on more iron when the patches is long.
X Q. 65. Who were the men working with you at the fire that day?
A. I couldn't exactly tell, sir; several men helped me.
X Q. 66. How many; more than two?
A. Yes, three. Three was the regular help for a day's work, you know.
X Q. 67. Were there four men at one fire?
A. There were three helpers and the T-rail patcher.
X Q. 68. What kind of a blast did you use?
A. The blast of a bellows.
X Q. 69. How many rails did you turn out that day?
A. Twelve, I think.
X Q. 70. Did you cut off rails in your shop?
A. Yes, sir; when I was ordered to.
X Q. 71. Did you never cut off any rails except when you got specific orders?
A. Yes, sir.
X Q. 72. What proportion of the whole number of rails that came into the shop were cut off?

1894 A. That I can't tell you, sir.

X Q. 73. Flavan says that one-fourth of the rails that came into the shop to be fixed were cut off. How would that agree with your estimate?

A. I don't believe I ever cut that many rails in the shop at Bloomington.

X Q. 74. Can you state what proportion you did cut off?

A. No, sir.

X Q. 75. How much did your patches average when you did that day's work you speak of?

A. From ten inches up to a foot.

X Q. 76. You state on your direct examination that it was not common to mend one end of a rail which you cut off at the other end. Do you still make that statement?

A. No, sir. I cut off one end and patched the other end to a certain limit when I got orders.

X Q. 77. Why, then, did you make that statement?

A. I didn't make that statement.

X Q. 78. Do you mean to deny making that statement?

A. I don't believe I ever made any such statement as that.

X Q. 79. Don't you know what statements you have been making here?

A. I think I do, sir.

X Q. 80. How happened it you didn't know you had made that statement?

A. I don't recollect making any such statement.

X Q. 81. If you can't recollect a statement you made this morning, how can you recollect a particular number of inches that you welded one day six years ago?

A. I don't know; I think about that.

X Q. 82. How happens it that you remember the particular number of inches, and don't remember the names of the men who worked with you?

1895 A. There were a good many men worked with me: I don't remember their names. Some of them I do, and some of them I don't.

X Q. 83. How came you to remember this particular day's work?

A. Well, I just put it down, designedly.

X Q. 84. Why designedly; with what design?

A. To see how many inches I could get out.

X Q. 85. That was a trial, then, to see how much you could do, was it?

A. Yes, sir.

X Q. 86. How long have you known Mr. Ragland?

A. I have known Mr. Ragland about 18 years.

X Q. 87. Used to work for him?

A. Yes, sir.

X Q. 88. Who first spoke to you about coming here to testify?

A. Maj. Ragland, sir.

X Q. 89. Did you talk with him about what your testimony was to be?

A. In fact, I don't know whether I did or not. I guess I did, though.

X Q. 90. How long ago was this that you talked with him, or that you guess you talked with him?

A. Two weeks ago last Sunday evening.

X Q. 91. Can't you remember certainly whether you talked with him or not, so short a time ago as that?

A. Yes, sir.

X Q. 92. Why did you say, then, when I asked you before that you couldn't remember whether you had talked with him or not?

(Objected to, that the witness has not so stated.)

A. I told you that I didn't know whether I spoke to him or not about testifying—about this business.

1896 X Q. 93. Where did he talk with you?

A. In the St. Nicholas Hotel, in Springfield.

X Q. 94. How came you to meet him there?

A. He left word at my house for me.

X Q. 95. What evening did you say it was?

A. Last Sunday, two weeks ago, evening.

X Q. 96. How long did you talk with him?

A. About ten or fifteen minutes.

X Q. 97. Did he tell you he wanted you to come to Chicago?

A. Yes, sir.

X Q. 98. Did he tell you what for?

A. He said he would mention it to me, if he wanted me, when I would come here.

X Q. 99. Did he talk with you about patching rails?

A. To the best of my opinion, he did.

X Q. 100. What did he say?

(Objected to as incompetent and immaterial.)

A. Well, sir, I don't know.

X Q. 101. Don't you recollect anything he said about patching rails?

A. I do, but what he said I can't recollect now.

X Q. 102. Do you mean you do recollect or you don't?

A. I mean what the words were. I don't recollect.

X Q. 103. What do you mean, then, when you say I do recollect; recollect what?

A. I recollect talking to him about rails, but what the words were I don't recollect.

X Q. 104. Do you mean to say you can't recollect anything he said to you about this business of rail-patching, so short time ago?

A. No, sir.

X Q. 105. What do you mean to say?

1897 A. I mean to say I don't know what the words were that he did say.

X Q. 106. Are you in the habit of having meetings with gentlemen at the St. Nicholas Hotel by previous appointment?

A. No, sir.

X Q. 107. Well, did he send you word he did want you to come to Chicago?

A. Not then he didn't; afterwards he did.

X Q. 108. When?

A. It was on Tuesday.

X Q. 109. Did he write to you or come himself?

A. He wrote to me this time.

X Q. 110. Have you seen him since?

A. I have seen him here.

X Q. 111. Where, this office?

A. In the hotel, I see him first when I come here.

X Q. 112. What hotel?

A. Mr. Wood's, sir.

X Q. 113. Did you have another talk with him then about mending rails?

A. No, sir.

X Q. 114. Didn't he say anything to you about this suit?

A. No, sir.

X Q. 115. Didn't he say anything to you about being examined as a witness?

A. No, not since I come here this last time.

X Q. 116. How long were you with him at Wood's house?

A. Oh, I don't know; I just seen him there to shake hands with him.

X Q. 117. Didn't you talk with him?

A. Yes, sir.

1898 X Q. 118. Why do you say then you only saw him to shake hands?

A. Well, he asked me how I was and I asked him the same; that is about all I recollect.

X Q. 119. Is that all he said to you?

A. Well, I believe it is, sir.

X Q. 120. How long were you there with him?

A. Oh, a few minutes; I can't recollect exactly.

X Q. 121. Will you swear you wern't there with him half an hour?

A. Talking to him?

X Q. 122. No; there is nothing said about that.

A. Yes, sir; I never was in his company there half an hour.

X Q. 123. Did he leave you at that house?

A. Oh, I come there myself.

X Q. 124. Did he go away and leave you there after shaking hands with you?

A. Yes, sir; he left my company.

X Q. 125. How came you to go to that hotel; did he give you the name?

A. Yes, sir.

X Q. 126. Did he come there to meet you?

A. Well, I don't know whether he did or not now; I met him in the hotel, I know.

X Q. 127. Who was with him?

A. Several men were around there; don't know as anybody in particular was with him.

Q. 128. Was that the only time you saw him in Chicago?

A. Oh, no, sir.

X Q. 129. When did you see him next?

A. I see him here before that.

X Q. 130. When?

1899 A. I think it is two weeks ago to-morrow, the best of my opinion.

X Q. 131. Did you come here on purpose to meet him?

A. Yes, sir.

X Q. 132. What did you talk about then; patching rails?

A. Well, I couldn't tell you exactly.

X Q. 133. Do you mean you can't or won't?

A. I mean to tell if I know it.

X Q. 134. The question is, do you mean to say you can't tell, or you won't tell?

A I don't mean to say I won't tell; I mean to tell anything I know.

X Q. 135. Do you mean to say you can't remember what you talked

about two weeks ago to-morrow; and do you expect anybody to believe you? If you do, say so.

A. Well, I can't exactly tell you, sir, what we talked about two weeks ago; now that's honest.

X Q. 136. I didn't ask you to tell exactly what you talked about; I asked you if you talked about patching rails. I now repeat the same question.

A. The best of my opinion is, we did.

X Q. 137. Don't you know you did?

A. Well, sir, I declare I don't.

X Q. 138. On that day you did such a big day's work, what was the shortest patch you put on?

A. Well, about 6 or 7 inches.

X Q. 139. And what was the longest?

A. Twelve inches.

X Q. 140. What was the average length of the patche'?

A. Well, between ten inches and a foot.

X Q. 141. What was the smallest day's work you ever did?

1900 A. The smallest day's work I ever did that I recolleet of was 12 rails.

X Q. 142. How many inches?

A. About 250.

X Q. 143. When was that?

A. That was in '67, sir.

X Q. 144. When did you do your first day's work patching rails?

A. To the best of my opinion in '65.

X Q. 145. Did you put on 250 inches the first day you ever patched?

A. No, sir.

X Q. 146. How many did you put on?

A. I don't know, sir; we never used to measure the iron we put on in them days in Springfield.

X Q. 147. What is your best judgment as to that first day's work?

A. At what?

X Q. 148. At patching rails.

A. Well, I don't suppose I put on more that 150 inches the first day.

X Q. 149. Can you swear that you put on a hundred?

A. Yes, sir.

X Q. 150. Why did you say just now that 250 inches was the smallest day's work you ever did, and now you say you put on 150 inches only the first day?

A. Well, the first day I wasn't in as good practice as I was afterwards.

X Q. 151. It is not true, then, that you put on 250 inches for your smallest day's work, is it?

A. It was in Bloomington I done that.

X Q. 152. Is it true, or not, that that was your smallest day's work? Please answer the question.

1901 A. 250 inches, that was my smallest day's work in Bloomington.

X Q. 153. I asked you what was your smallest day's work; I said nothing about Bloomington. I ask you now what was your smallest day work anywhere?

A. I can't exactly tell what my smallest day's work was when I commenced. Them were my smallest days' work, I know.

X Q. 154. Who did you receive these instructions from about cutting off rails?

A. From the road-master, and foreman, and section bosses.

X Q. 155. Sometimes from one and sometimes the other?

A. Well, yes; but generally the foreman was the most that used to order us.

X Q. 156. How many rails did you used to average a day at Bloomington?

A. Well, about 15, sir.

X Q. 157. How many was the smallest number you would do in a day?

A. Well about 10 and 12.

X Q. 158. What was the largest number?

A. I done 30 rails.

X Q. 159. What was the average number of inches on each rail, taking one day with another, at Bloomington?

A. About 16 inches.

X Q. 160. How was it at Springfield?

A. About the same.

X Q. 161. Have you kept any account of what you did; if so, where is it?

A. No, sir.

X Q. 162. When you mended thirty rails in one day, how many inches did you mend per rail?

1902 A. Some more and some less.

Q. 163. What would be the average?

A. About 8 or 9 inches.

Q. 164. What was the longest patch you put on that day?

A. Well about seven or eight inches.

Q. 165. What was the shortest?

A. An inch or two.

Redirect examination by Mr. Curtis:

Q. 75. You were asked, in cross-examination, whether the road-masters kept an account of the iron sent to the shop. You said you expected they did. Did you ever see any such accounts, and do you actually know any thing about them?

A. No, sir.

Q. 76. When you were mending at Bloomington, did you, or not, use different thicknesses and widths of patch-iron during the day, according to the kind of patch the different rails called for?

A. Yes, sir.

Q. 77. When you marked on the slate the inches of patch-iron you had used, did you put down anything to show what thickness and width you had been using, or did you put down the length without regard to the thickness or kind?

A. Only put down the length.

Q. 78. You were asked, on cross-examination, if you ever cut off rails without specific orders. Did you know what the counsel meant by specific orders?

A. No, sir.

Q. 79. When you were here two weeks ago to-morrow, as you say, were you here expecting to testify in this cause?

A. Yes, sir.

Q. 80. Did you return to Springfield again?

A. Yes, sir.

1903 Q. 81. Did you get any instructions as to how you should give your testimony?

A. No, sir.

Recross examination:

X Q. 166. You say when you were here two weeks ago to-morrow, at Wood's Hotel, you were expecting to testify in this cause. What led you to expect that?

A. Well, Mr. Ragland told me so.

X Q. 167. When?

A. At the time I came up. I think it was Tuesday or Wednesday I came up from Springfield.

X Q. 168. Where did he tell you this?

A. He told me—I don't know whether it was in Springfield or here. I forgot.

X Q. 169. But you knew that you were expected to testify in the case, did you?

A. Yes, sir.

X Q. 170. And, in regard to patching rails, you knew that also, didn't you?

A. Yes, sir.

X Q. 171. Did you know what matters they wanted to learn from you about patching rails?

A. No, sir; I don't know anything particular about it—only they wanted me to testify.

X Q. 172. Didn't Mr. Ragland ask you how much you could do at patching rails in one day?

A. Well, to the best of my opinion, he did.

X Q. 173. Didn't he ask you how many rails you were in the habit of cutting off?

A. I couldn't say; I don't think he did.

his
WILLIAM + FLYNN.
mark.

1904 MONDAY, *December 22d*, 1873.

Present: Walter Curtis, esq., of counsel for complainant; the complainant in person; John N. Jewett, John B. Niles, George Payson, and R. Biddle Roberts, esqrs., of counsel for defendants.

WILLIAM COSTIGAN.

Q. 1. Please state your name, age, residence, and occupation.

A. William Costigan; age, 40; residence, Chicago; occupation, blacksmith.

Q. 2. Have you ever worked at mending railroad-rails; if so, how long; where have you worked at that business, and for whom?

A. Yes, sir, I have; about eight years for the Chicago & Alton; before that I worked at the Pacific shop in St. Louis—the Missouri Pacific; I began in or about 1859. I worked for Mr. Ragland before I worked for the Chicago & Alton.

Q. 3. At what places did you work for the Alton Railroad, and how long did you work in each place?

A. Springfield, Illinois; was about four years there, and I worked in or about four years in Jacksonville.

Q. 4. Did you work for the company as a helper, or have charge of a fire?

A. No, sir; had charge of a fire all the time.

Q. 5. State whether or not you were foreman of a shop at Springfield for a part of the time.

A. Yes, sir; I had for a short time.

Q. 6. Look at the two models marked "Whitcomb Machine" and

"Exhibit A, E. B. G.," and see how they compared with the machines you used while working for the company.

A. At the low iron I used a machine something like that, (witness indicates Exhibit A, E. B. G.,) and for the fish-plate I used one like this. (Witness indicates Whitcomb machine.)

1905 Q. 7. How far did the machine stand from the furnace, and in what direction from the opening into the furnace?

A. About five or six feet from the furnace, on a line with the furnace-door.

Q. 8. Have you, or not, ever experienced any difficulty in using those machines in consequence of the jaws cooling the rails before the patch could be welded on?

A. No, sir; I never seen no difficulty.

Q. 9. How long a time was the rail within the jaws before the patch was welded down onto it?

A. About a couple of minutes.

Q. 10. State whether or not, when you mended for the company, both at Springfield and Jacksonville, you mended rails at both ends.

A. Yes, sir, I have.

Q. 11. State whether you mended more at both ends than at one, or less at both ends than at one.

A. I did most at both ends.

Q. 12. Did you or not also mend centers?

A. Yes, sir; I have.

Q. 13. Did you mend centers and ends and both ends on the same rail.

A. Yes, sir.

Q. 14. Did you mend any flanges?

A. Yes, sir.

Q. 15. State whether or not, where a rail required mending on the flange, it usually required mending on the head or top of the rail also.

A. Yes, sir, it generally did.

Q. 16. Did you put in any Dutchmen, so-called; and, if so, how often?

A. Yes, sir, I have; not very often; a thing I never made it a practice of doing.

1906 Q. 17. While you worked at Springfield did you or not keep any account of the work done at your fire; and, if so, what did you put down?

A. Yes, sir, I did; I put down every day's work according as I went along.

Q. 18. Did you put down the number of rails?

A. Yes, sir.

Q. 20. Did you put down the number of feet and inches welded?

A. No, sir.

Q. 21. Did you put down the amount of iron used?

A. No, sir.

Q. 22. State whether or not you had any directions from any of the road-masters or foremen, while you worked at Springfield, in regard to the length of the patch you should put upon the rail.

A. No, sir; I never had no instructions.

Q. 23. What guided you as to the length of patch you should put on the rail?

A. My own judgment.

X Q. 24. How long, in inches, did the patches or mends average per rail, according to the best of your recollection?

A. Seventeen to eighteen inches.

X Q. 25. How long a patch or mend did you put on one rail at any time?

A. I put five feet and over.

X Q. 26. How many inches could you, and did you, weld at one heat at any time?

A. I have welded 15 inches.

X Q. 27. Who were the road-masters at Springfield while you worked there?

A. Mr. Huskinson was the first man. I believe there was a man of the name of Maher there for a short time; he didn't stay there very long; then a man of the name of Couse; then a man named Quaid—Jerry Quaid; after him comes Mr. Lee.

1907 X Q. 28. How often were any of these road-masters accustomed to coming into the shop where you were at work?

A. Sometimes, about once or twice a week.

X Q. 29. How many rails did you turn out to the fire per day, on the average?

A. I think, as near as I can go, from nineteen to twenty rails.

X Q. 30. How many rails did you ever turn out in one day, that you remember?

A. I turned out fifty or over.

X Q. 31. What wages did you get at Springfield, and what at Jacksonville?

A. Four dollars, a part of the time, at Springfield, $3.50 and $3.25; at Jacksonville, $3.25; a part of the time, $3.15 I think, and $3.20 I believe; I ain't sure—a few cents taken off.

Q. 32. When did you cease to work for the company at Jacksonville?

A. In 1873.

Q. 33. Who was in charge of the shop at Jacksonville?

A. Thomas McClennan.

Q. 34. Who was road-master at Jacksonville?

A. Mr. Rowe.

Q. 35. Did you get any orders there from either the road-master or foreman, or anybody else, how much you should put on a rail?

A. No, sir.

Q. 36. Did you put on more or less than you had at Springfield?

A. Generally about the same.

Q. 37. Did you work in the shop at Springfield with a man by the name of Snodgrass?

A. Yes, sir.

1908 Q. 40. While you and he were working there were there any frogs made in the shop?

A. Yes, sir.

Q. 41. What machine were they made in?

A. Blocks similar to them two.

(Witness indicates "Exhibit A, E. B. G." and "Exhibit Whitcomb machine.")

Q. 42. Were they made in the jaws?

A. Yes, sir; always cut the point in the block.

Q. 43. Who made them?

A. I made them.

Q. 44. Did Snodgrass make any?

A. No, sir; not to my knowledge.

Q. 45. Mr. Lee has told us that Snodgrass made all the frogs while you and he were there; what do you say to that?

A. I don't believe it.

Q. 46. He has also said, in another place, that you might have helped a little, but Snodgrass generally made them. State whether or not Snodgrass generally made them, and whether you helped a little, or whether you made them and he helped a little.

A. Well, I recollect one day that I was sick, being out of the shop, they were in need of a frog very bad, and they put Snodgrass to work at one, and it remained there after they worked a day on it until I come back and finished it.

Q. 47. With that exception, did you know of Snodgrass working on any frogs?

A. No, sir.

Q. 48. When you worked at Springfield did you cut off any rails?

A. Yes, sir; I have.

Q. 49. Did you cut off any rails, and also patch the same rail?

A. Yes, sir; I have.

1909 Q. 50. About what share of the whole number you worked on at Springfield do you think you cut off and didn't patch at all in any way?

A. Well, that I couldn't tell; it would be all guess-work so long as I didn't keep any account of it.

Q. 51. Was it a large part or a small part of the whole number you worked on?

A. The smallest share was cut off in the shop.

Q. 52. State whether you cut off more the latter part of the time you worked for the company than you did at first.

A. Well, about the same all through.

Q. 53. When you worked at Jacksonville did you return the number of rails you mended?

A. I did for a while.

Q. 54. State whether or not, after a while, the mended rails were not returned; and if they were not, why not?

A. Well, my reasons for it, I think they were in somewhat of a difficulty about those machines, and they didn't want to return it in as rails repaired; they returned it in as repair work.

(Question and answer objected to as incompetent.)

Q. 55. Did you have a talk with the road-master or foreman about it?

(Objected to.)

A. There was a little remarks between me and the foreman; not between the road-master.

Cross-examination by Mr. Payson:

X Q. 1. How are you at present employed?

A. I am employed in this case at present.

X Q. 2. In what capacity?

A. A. As a witness.

X Q. 3. How long have you been so employed, and who employed you?

1910 A. I can't tell exactly how long since the conversation first had with Mr. Turrill. Mr. Turrill employed me.

X Q. 4. Where did you meet him?

A. Down in Mr. Abbey's gunsmith-shop.

X Q. 5. How came you there?

A. He sent for me; would like to see me, he said.

X Q. 6. Where did he send?

A. He sent to my house in Chicago.

X Q. 7. How are you employed aside from this case at present?

A. He told me, as long as I was working, he would pay me reasonable pay for my time as long as I was occupied in this case—reasonable pay, whatever my time was worth.

X Q. 8. What were you doing before he so employed you?

A. I wasn't doing anything.

X Q. 9. How long had you been doing nothing?

A. About two months.

X Q. 10. When did you leave the Chicago & Alton Road?

A. I guess in January, '73.

X Q. 11. Why did you leave?

A. I left because they were slack of work; that was the understanding, or otherwise they were going to run at less expense; that was the understanding I got.

X Q. 12. You were one of the men that they discharged?

A. Yes, sir.

X Q. 13. Where was it you knew Snodgrass?

A. At Springfield.

X Q. 14. During what years?

A. 1867 and 1869, I think.

X Q. 15. How was it in '68?

A. He wasn't there in '68.

X Q. 16. How many patches did you average to a day?

1911. A. I didn't keep any account of patches; how many patches I averaged.

X Q. 17. Please give us your best judgment.

A. It will be only guessing.

X Q. 18. Well, let us have your best guess.

A. Well, I don't think I could guess it.

By Mr. CURTIS. Guess as well as you can.

A. I might put on 40 or 50 patches.

X Q. 19. How long have you known Mr. Turrill?

A. I am acquainted with him about a month.

X Q. 20. Do you know Mr. Ragland?

A. Yes, sir; I worked for Mr. Ragland. I have known him 18 years.

X Q. 21. When did you work for him?

A. I worked for him before '65; I worked for Mr. Ragland.

X Q. 22. Have you talked to him about this case?

A. No, sir.

X Q. 23. Have you talked with him about mending rails lately?

A. Yes, sir.

X Q. 24. When and where?

A. We have talked about rail-patching walking the street together; the last conversation we had upon it was some time last week. I can't exactly tell the day.

X Q. 25. When did you talk with him about it before that?

A. Oh, we had several conversations before that, in patching rails.

X Q. 26. When did you get out the 50 rails and upwards, you speak of?

A. I have done it while I worked for the company.

1912 X Q. 27. When?

A. '55 or '56; '65 or '66, I should say.

X Q. 28. What did you do to them?

A. I patched 'em.

X Q. 29. Every one of them?

A. Yes, sir; I patched every one of them.

X Q. 30. Patched each one of them at both ends, didn't you?

A. No, sir.

Q. 46. He has also said, in another place, that you might have helped a little, but Snodgrass generally made them. State whether or not Snodgrass generally made them, and whether you helped a little, or whether you made them and he helped a little.

A. Well, I recollect one day that I was sick, being out of the shop, they were in need of a frog very bad, and they put Snodgrass to work at one, and it remained there after they worked a day on it until I come back and finished it.

Q. 47. With that exception, did you know of Snodgrass working on any frogs?

A. No, sir.

Q. 48. When you worked at Springfield did you cut off any rails?

A. Yes, sir; I have.

Q. 49. Did you cut off any rails, and also patch the same rail?

A. Yes, sir; I have.

1909 Q. 50. About what share of the whole number you worked on at Springfield do you think you cut off and didn't patch at all in any way?

A. Well, that I couldn't tell; it would be all guess-work so long as I didn't keep any account of it.

Q. 51. Was it a large part or a small part of the whole number you worked on?

A. The smallest share was cut off in the shop.

Q. 52. State whether you cut off more the latter part of the time you worked for the company than you did at first.

A. Well, about the same all through.

Q. 53. When you worked at Jacksonville did you return the number of rails you mended?

A. I did for a while.

Q. 54. State whether or not, after a while, the mended rails were not returned; and if they were not, why not?

A. Well, my reasons for it, I think they were in somewhat of a difficulty about those machines, and they didn't want to return it in as rails repaired; they returned it in as repair work.

(Question and answer objected to as incompetent.)

Q. 55. Did you have a talk with the road-master or foreman about it?

(Objected to.)

A. There was a little remarks between me and the foreman; not between the road-master.

Cross-examination by Mr. Payson:

X Q. 1. How are you at present employed?

A. I am employed in this case at present.

X Q. 2. In what capacity?

A. A. As a witness.

X Q. 3. How long have you been so employed, and who employed you?

1910 A. I can't tell exactly how long since the conversation first had with Mr. Turrill. Mr. Turrill employed me.

X Q. 4. Where did you meet him?

A. Down in Mr. Abbey's gunsmith-shop.

X Q. 5. How came you there?

A. He sent for me; would like to see me, he said.

X Q. 6. Where did he send?

A. He sent to my house in Chicago.

X Q. 7. How are you employed aside from this case at present?

A. He told me, as long as I was working, he would pay me reasonable pay for my time as long as I was occupied in this case—reasonable pay, whatever my time was worth.

X Q. 8. What were you doing before he so employed you?

A. I wasn't doing anything.

X Q. 9. How long had you been doing nothing?

A. About two months.

X Q. 10. When did you leave the Chicago & Alton Road?

A. I guess in January, '73.

X Q. 11. Why did you leave?

A. I left because they were slack of work; that was the understanding, or otherwise they were going to run at less expense; that was the understanding I got.

X Q. 12. You were one of the men that they discharged?

A. Yes, sir.

X Q. 13. Where was it you knew Snodgrass?

A. At Springfield.

X Q. 14. During what years?

A. 1867 and 1869, I think.

X Q. 15. How was it in '68?

A. He wasn't there in '68.

X Q. 16. How many patches did you average to a day?

1911. A. I didn't keep any account of patches; how many patches I averaged.

X Q. 17. Please give us your best judgment.

A. It will be only guessing.

X Q. 18. Well, let us have your best guess.

A. Well, I don't think I could guess it.

By Mr. CURTIS. Guess as well as you can.

A. I might put on 40 or 50 patches.

X Q. 19. How long have you known Mr. Turrill?

A. I am acquainted with him about a month.

X Q. 20. Do you know Mr. Ragland?

A. Yes, sir; I worked for Mr. Ragland. I have known him 18 years.

X Q. 21. When did you work for him?

A. I worked for him before '65; I worked for Mr. Ragland.

X Q. 22. Have you talked to him about this case?

A. No, sir.

X Q. 23. Have you talked with him about mending rails lately?

A. Yes, sir.

X Q. 24. When and where?

A. We have talked about rail-patching walking the street together; the last conversation we had upon it was some time last week. I can't exactly tell the day.

X Q. 25. When did you talk with him about it before that?

A. Oh, we had several conversations before that, in patching rails.

X Q. 26. When did you get out the 50 rails and upwards, you speak of?

A. I have done it while I worked for the company.

1912 X Q. 27. When?

A. '55 or '56; '65 or '66, I should say.

X Q. 28. What did you do to them?

A. I patched 'em.

X Q. 29. Every one of them?

A. Yes, sir; I patched every one of them.

X Q. 30. Patched each one of them at both ends, didn't you?

A. No, sir.

X Q. 31. How many of them at both ends?
A. About three-thirds.
X Q. 32. What did you do with the other thirds?
A. Three thirds! They ain't six-thirds altogether—three-fourths.
X Q. 33. What did you do with the other fourth, mend them at one end?
A. Patched one end; put a Dutchman in some of them.
X Q. 34. Did you patch any in the center?
A. Yes, sir; I have.
X Q. 35. Out of those fifty how many?
A. I couldn't say I patched any out of them fifty.
X Q. 36. How many inches did you put on that day?
A. That I could not tell; I didn't measure them.
X Q. 37. Did you usually measure the number of inches you put on in a day?
A. No, sir.
X Q. 38. You don't know, then, what the average length of patches you used to put on per rail would be, do you?
A. No, only to the best of my judgment; take one rail with the other, they would average from seventeen to eighteen inches.
X Q. 39. You didn't keep any account of it?
A. Nothing more than measure some patches once in a while.
1913 X Q. 40. How long were the patches generally, that you put on?
A. I have patched rails as high as 5 feet and over.
X Q. 41. You would not do that very often, of course?
A. Yes, I have done it several times.
X Q. 42. How short were the shortest patches?
A. From two to three inches.
X Q. 43. What was their general length?
A. That was the general shortest patch I put in.
X Q. 44. What would most of the patches measure?
A. Some patches measure 20 inches; 12 inches; 10 inches; 8 inches; and so on, down as low as three or four.
X Q. 45. Taking them all together, what would be the average length of a patch, during the whole time you worked?
A. About eighteen inches.
X Q. 46. Do you mean what you say?
A. Yes, sir; I mean taking it on an average—the average length of the rails all through.
X Q. 47. That is not the question; the average length of the patches?
A. Well, I thought I stated that before; about 18 inches a patch, taking an average of the rails right through.
X Q. 48. What I want to get at, is not the average amount of patching to a rail, but the average length of a patch?
A. About ten inches.
X Q. 49. When you mended those 50 rails, did you put on more or less to a rail than usual?
A. Sometimes more and more times less.
X Q. 50. Taking the whole day's work together, did you put more or less on the rail than you were in the habit of doing at other times?
A. I put less.
X Q. 51. Do you know what the welding-heat of iron is, measured on Fahrenheit's thermometer?
1914 A. No, sir, I ain't posted on figures at all.

X Q. 52. Do you know how long it takes to bring a rail to welding-heat in such a fire as you used?

A. Yes, sir; I have tried it several times.

X Q. 53. How long does it take?

A. It will take a welding-heat in 5 or 6 minutes, if the fire is in good order.

X Q. 54. How many times did you put the rail into the fire whilst putting on an ordinary patch?

A. Sometimes once.

X Q. 55. Generally, how often?

A. Twice.

X Q. 56. How long did it take you to pick up the rail, put it into the fire, heat it, and weld on a patch of ten inches, and put the rail back into the pile?

A. About ten or twelve minutes, laid outside of door finished, and all in about ten minutes, ten inches to the patch.

X Q. 57. Is that as long as it generally took?

A. Long as it generally took when the fire was in good order working.

X Q. 58. Well, taking the fire and everything else in their ordinary working order, did you do it in ten minutes?

A. Yes, sir, and I can do it in less.

X Q. 59. Now, will you please to tell us how long it took to get the rail into the chain and into the fire, from the pile where you took it?

A. About a minute or two; sometimes it might take a couple of minutes or less.

X Q. 60. Then how long was it in the jaws?

A. Didn't remain there two minutes in the jaws.

X Q. 61. The question isn't how long it didn't remain, but how long it did; was it about two minutes in the jaws?

A. About two minutes; it might be less.

1915 X Q. 62. Then you took it out of the jaws and put it into the grooves, and swaged it down, did you not?

A. Took it out of the jaws, put it on its side, swaged it down, turned it over on the other side, and swaged that down.

X Q. 63. The foreman holding the swage and the helpers striking it with their sledges?

A. Yes, sir.

X Q. 64. Well, how long did that take?

A. I don't suppose it would take half a minute.

X Q. 65. For both edges?

A. Yes, sir; both sides.

X Q. 66. How many blows did they usually strike to a side?

A. A thing I can't tell; never counted.

X Q. 67. How long did it take to get the rail back into the pile?

A. I don't suppose it took a second.

X Q. 68. When did they have time to take the second heat you say they generally did take? your ten minutes are all used up with the processes you have described.

A. I never took the second heat on it after bringing her out the second time; took only one heat on it for a weld.

X Q. 69. You stated, a few minutes ago, that you generally took two heats; which of those statements are we to believe?

A. Not welding; I did in scarfing and welding.

X Q. 70. When did you make that heat?

A. When I was going to put on my patch.

X Q. 71. How long would it take it to scarf it, get on the heat you have spoken of, and put on the patch?

A. I didn't scarf the rail at all that I have mentioned, at all.

X Q. 72. You were not in the habit, then, of scarfing the rails?

1916 A. At the time when it's needed.

X Q. 73. The question is whether you were in the habit of scarfing the rail?

A. Generally.

X Q. 74. How long did it take to do that, and get that other heat you have spoken of?

A. I can put on ten inches in ten minutes, or less, bring in the rail and all.

X Q. 75. The question is, how long does it take to bring up the heat and make the scarf?

A. I don't suppose it took me a minute.

X Q. 76. Did you ever take note of how many patches you could put on in an hour or a day?

A. No, sir.

X Q. 77. Can you swear that your rails would average 18 inches of patch?

A. No, sir.

X Q. 78. Can you swear that they would average 16 inches?

A. No, sir.

X Q. 79. Can you swear that they would average 14 inches?

A. No, sir.

X Q. 80. Can you swear that they would average 12 inches?

A. No, sir; not to a patch.

X Q. 81. You are not perfectly sure, then, that you did put on as much as 12 inches to a rail, are you—not perfectly sure, so as to swear to it?

A. 12 inches to a rail, that is what I don't understand. 12 inches to a patch, I thought; 12 inches to a rail; I have averaged 18 inches to a rail. I misunderstood that the other way.

1917 X Q. 82. Will you swear positively that you did average 18 inches to a rail?

A. Yes, sir; I have, or about 18.

X Q. 83. The question is, not what you have done at any one time, but whether you are willing to swear that all the rails you have mended would average, every one, 18 inches?

A. Yes, sir; I am. They would average eighteen inches, one with another, in or about.

X Q. 84. Do you mean to be understood to say that a thousand rails would give 18,000 inches of patching?

A. That I can't tell. I can't go up as high a tone as that reckoning up. I can't figure up that amount.

X Q. 85. Do you know what the word "average" means; if so, will you please state?

A. The average means, I think, about the biggest proportion.

X Q. 86. And it is in that sense that you have used the word in giving your testimony, have you?

A. Yes, sir.

Redirect examination by Mr. Curtis:

Q. What kind of a fire did you use; an open fire or a close furnace?

A. A close furnace.

W. COSTIGAN.

TUESDAY, *December 23d*, 1873.

Present: Walter Curtis, esq., of counsel for complainant; the complainant in person, John N. Jewett, John B. Niles, R. Biddle Roberts, and George Payson, esqrs., of counsel for the defendants, and the witness below named.

JERRY QUAID.

Q. 1. Please state your name, age, residence, and occupation.
1918 A. Jerry Quaid; age, 48; residence, Chicago; occupation, railroad work.

Q. 2. State whether or not you were ever road-master in the employ of the Chicago & Alton Railroad Company; if so, when, how long, and on what portion of the road were you so employed?

A. I was in the fall of '65 to the fall of '66, a year. I was employed between Elkhart and Carlinville.

Q. 3. Where were the rail-mending shops on your division, and where were your own headquarters?

A. Springfield, Illinois.

Q. 4. How many fires were run there for mending rails while you were road-master?

A. Two.

Q. 5. Were they or not constantly employed at rail-pa'ching?

A. They were.

Q. 6. Who had practical charge of the rail-mending in that shop while you were road-master?

A. William Costigan.

Q. 7. State whether or not you gave any orders, or knew of any orders at any time being given, to Wm. Costigan as to the length of patch he should put on rails.

A. I never gave him no order to that effect. I don't know of any.

Q. 8. To what was the length of patch left?

A. I don't understand.

Q. 9. What determined the length of patch that should be put on rails?

A. I don't fully understand the question the way you put it. I might answer it this way: we patched them to the extent that was required.

Q. 10. State, if you please, what the condition of the iron was
1919 while you was road-master, and what amount of patching the rails called for, and what the necessities of the road were with reference to the matter of mending, on your division while you were road-master?

A. The iron was very much worn—in a very bad condition; we had to patch it; well, the patches would run, I should think they would average, from 18 to 20 inches to a rail. The condition of our track was bad; we had no material except what we could take out and repair, during most of the time.

Q. 11. State what your practice was on your division with reference to the cutting off of rails.

A. We, when we cut rails off, we cut 'em off cold; we used them for side-track purposes; we use them in side track; this is short iron I speak of, fifteen or sixteen feet long, and we would take out the longer iron out of the side track and put it in the main line.

Q. 12. Where were these rails cut cold; by whom were they cut off; how often did you use to cut rails, and, in the matter of cutting, did the men who used to work in the shop have anything to do with it?

A. The section-men cut those rails on the line of the road; I can't say how many a day; we used to cut them every day, more or less; the men in the shop had nothing to do with it.

Q. 13. Did the rails go to the shop to be cut off?

A. Not cold.

Q. 14. What was your practice with reference to ascertaining and keeping a record of the amount of iron used in patching rails?

A. Well, we received this iron on a requisition the first of the month, for patching rails or any other purpose; when we received it it was put into the hands of the blacksmith in charge in his shop. He used the necessary amount of this iron until the first of the next month; then we weighed the balance on hand, and charged the iron to the work which was done.

1920 Q. 15. You charged, then, the difference between the amount you received and the amount you had remaining on hand at the end of the month, did you?

A. Yes, sir.

Q. 16. Did the blacksmith keep an account of the amount of iron put onto each rail, or of the amount of iron used each day in patching rails, or not?

A. Not that I am aware of—not to my knowledge.

Q. 17. Whether or not you sometimes run out of iron before the month was through, and made a requisition for a further lot before the month was closed?

A. Yes, we very frequently run out.

Q. 18. About how much iron should you say, from the requisitions you made, was generally used in a month for patching rails?

A. I can't get at that very definitely.

Q. 19. As near as you can tell us. Take an average, one month with another.

A. 2,000 pounds—2,500—about 2,000 pounds, as near as I can estimate it.

Q. 20. State whether or not you kept any book which showed the number of feet and inches welded upon the rails each month; and, if so, into whose possession that book passed when you left the employment of the company.

A. I did; the book passed into Mr. Shenute's hands; he was chief engineer of the company.

Cross-examination by Mr. Payson:

X Q. 1. Can you swear that your rails averaged eighteen inches to a rail?

A. I think they did.

X Q. 2. The question is, not what you think but what you can swear to?

A. That is the best of my recollection.

X Q. 3. Will you please answer the question?

1921 (Complainant objects that the witness has already answered the question fairly and honestly, and instructs the witness that he can answer the question, "I have already done so.")

A. I have already done so.

X Q. 4. Is that the only answer you are willing to make to the question dictated by complainant's counsel?

A. I have given this answer to the best of my recollection.

X Q. 5. Were the other answers you have already given dictated to you by the complainant's counsel?

A. No.

X Q. 6. Are you here to answer from your own knowledge or from his dictation?

A. From my own knowledge.

X Q. 7. Will you please state, then, whether you know with absolute certainty that you patched each rail to the extent of eighteen inches?

A. We didn't patch each rail to the extent of eighteen inches.

X Q. 8. What was the least you put upon a rail?

A. About six inches.

X Q. 9. Did you ever put in any Dutchmen?

A. Yes, sir. What do you mean by Dutchmen?—let me understand it.

X Q. 10. Do you mean to say you don't know what the meaning of a Dutchman is?

A. In repairing iron, I don't.

X Q. 11. Why did you answer the question first in the affirmative?

A. I don't propose to answer it in relation to this iron. We used to put in what we term Dutchmen in timber-work, but I never heard of it in repairing iron before.

X Q. 12. Will you swear now that you averaged 18 inches to a rail, positively?

1922 A. That is the best of my opinion and recollection.

X Q. 13. But you can't swear positively to it?

A. No; I couldn't, positively.

X Q. 14. Can you swear positively that you averaged as much as twelve inches a rail?

A. Yes, I could do that with safety.

X Q. 15. Are you as sure of that as of anything else you have testified to?

A. I am.

X Q. 16. What is your present employment?

A. Railroading.

X Q. 17. Where; in what way?

A. Building.

X Q. 18. Who first asked you about testifying in this suit?

A. Maj. Ragland left a note at my house that he wished to have me come and see this gentleman, Mr. Turrill.

X Q. 19. How long have you known the major?

A. I have known the major since 1865 or 1866.

X Q. 20. Ever talked with him about this suit?

A. Yes.

X Q. 21. When?

A. On Friday, I think; Thursday or Friday, I am not certain; Thursday.

X Q. 22. What passed between you at that time?

A. He wanted to know of me if I had any recollection of that work which was done in those shops at Springfield during my time there; I replied yes. He intimated then that, in all probability, I would be required to come down here before this court.

X Q. 23. Is that all?

A. He stated that there was a suit pending before this court here, and my evidence might be required; and, if so, they would send for me.

1923 X Q. 24. Anything else?

A. No.

X Q. 25. How long did that conversation last?

A. He was probably in my company there half an hour.

X Q. 26. Didn't you ask him what you would be wanted to testify to?

A. I did.

X Q. 27. Why didn't you say so before, when I asked you if there was anything else?

A. I didn't think it was required.

X Q. 28. What did he tell you when you asked him?

A. A case pending between the railroad company and this gentleman, Mr. Turrill.

X Q. 29. Is that all he told you?

A. About all, sir; that is, on those points.

X Q. 30. Didn't he ask you what you recollected about rail-patching?

A. I don't remember whether he did or not; I think not.

X Q. 31. Did you afterwards talk with Mr. Turrill about it?

A. I met Mr. Turrill on yesterday, and talked with him.

X Q. 32. Who were the men in the shop at the time you were road-master?

A. Mr. Costigan, Wm. Costigan, Flynn, and Crow; don't remember Mr. Crow's first name, nor Flynn's. These were the three principal smiths.

X Q. 33. Did you know these men well?

A. I did.

X Q. 34. Do you know how Flynn came to leave the service of the company?

A. I do not.

Redirect examination by Mr. Curtis:

1924 X Q. 21. State whether or not your conversation with Maj. Ragland principally related to a curve you were putting in on some railroad?

A. It did.

JERRY QUAID.

SATURDAY, *December* 20, 1873.

Present: Walter Curtis, esq., of counsel for complainant; the complainant in person, John N. Jewett, George Payson, R. Biddle Roberts, and John B. Niles, esqrs., counsel for defendants, and the witness below named.

JOHN H. LAKEY.

Q. 1. Please state your name, age, residence, and occupation.

A. John H. Lakey; age, 48; residence, Turner's Junction, Du Page County. I have charge of the shops of the Northwestern Railroad at Turner's Junction.

Q. 2. Have you been examined before as a witness in this case?

A. Yes, sir.

Q. 3. Whether or not you are a blacksmith by trade?

A. Yes, sir.

Q. 4. Will you state a little more fully than you did in your former examination what has been the extent and variety of your experience in the mending of railroad rails?

A. I commenced repairing rails for the Galena & Chicago Union Railroad Company in the month of July, 1854, on the common anvil. In June, 1857, that company bought of Cawood his patent swage-block, and commenced using that; and I used it from that time until the summer of 1869, with the exceptions of about seven months, when I was out of the employ of the company, in 1859 and 1860. In 1871, July, 1871, I

took charge of repairing rails under Bain's patent, and have had charge up to the present time, and have now charge.

1925 Q. 5. Since the consolidation you have been in the employment of the Northwestern Railroad Company, have you not?

A. I have.

Q. 6. Have you had any other duties besides those relating to the mending of rails; if so, what?

A. Well, from July, '54, until November, '57, I was foreman of blacksmith shop; had charge of rail-repairs, track-tool repairs, and what engine blacksmith work we had to do at those shops; and from that time until June, 1859, had the general charge of the repairs of engines running to and from that station, in addition to the charge of the blacksmith-shop. In January, 1860, I took a contract with the Galena & Chicago Union Railroad Company to repair their rails at that point, and continued that contract until July the same year, when the contract was thrown up, and I had charge of the shops again the same as I had from '57 to '59.

Q. 7. State why that contract was given up, and on what machine the work was done while you had such contract, and at what price.

A. The only reason that was given me why that contract was thrown up, was because the company thought I was making too much money out of it. The price paid under the contract was 2½ cents an inch for ends, and 3 cents an inch for centers, the company furnishing all the materials. The work was done on the Cawood block. The Cawood blocks, and a block similar to the block there, marked "Whitcomb Machine." Part of the time one Whitcomb, and part of the time two Whitcomb machines were used; all the time one Cawood, and part of the time two Cawood machines were used.

Q. 8. Can you state about what was the average amount of work done, to the fire, in inches, during the period of the work under this contract?

A. I can give it only from memory.

Q. 9. Please state it from memory, according to the best of your recollection.

A. I think we averaged fully 250 inches per fire per day.

1926 Q. 10. Did you do more or less work per day during this contract than the average during the period the work has been done for the company, and did you pay more wages to the men than the company paid, or not?

A. I think I done more work and paid more wages.

Q. 11. State what the book now handed to you is, and what it contains. (Handing book to witness.)

A. This is a book, a memorandum of rail-work done at Turner Junction shop, commencing November, 1862, and ending March, '64.

Q. 12. State whether or not the book contains the amount of work, in inches, done each day during the months that are set down there.

A. Well, as far as I see, it does.

Q. 13. Are any of the months added up so that you can tell from the book the average amount of mending done per day, in inches?

A. Yes.

Q. 14. What is the average amount for the months that are added up in the book?

A. Well, they are in the neighborhood of 250 inches, so far as I have examined; the figures would tell each month; that is, some of the months are footed here and some are not; they can all be averaged, I think; the T-rail account here was kept in accordance with the

orders of the mechanical department of the Galena & Chicago Union Railroad Company.

Q. 15. Will you point out to the examiner, to be copied by him, the accounts of T-rail mending during the months of December, '63, and March, '64?

A. December, '63.

1927 *T-rail account, December, 1863.*

Day month.	No. bars, ends only.	No. inches.	Ends and centers.	No. inches.	No. bars, centers.	Inches, centers.	New iron.	Strap iron.	Flanges.
1	16	347	4	150	1	16	144	.....	30
2	20	397	3	96	.....	.....	94	.....	.....
3	18	350	7	191	.....	.....	94	.....	30
4	25	538	7	221	1	16	181	31	.....
5	19	357	9	310	.....	.....	151	36	.....
7	17	427	4	147	2	52	135	49	.....
8	19	372	6	168	1	26	98	68	.....
9	19	396	10	330	3	55	210	38	.....
10	12	258	6	164	1	29	102	85	.....
11	15	230	8	267	1	20	106	51	.....
12	14	290	10	337	1	20	146	.....	6
14	20	464	5	136	1	18	148	.....	11
15	16	328	7	257	1	18	150	.....	.....
16	18	395	5	162	3	89	152	39	.....
17	16	377	8	313	.....	.....	142	28	.....
18	10	219	8	465	1	48	175	62	.....
19	15	333	6	261	2	40	197	62	.....
21	7	152	4	143	.....	.....	53	.....	.....
22	11	222	7	244	.....	14	102	28	.....
23	15	327	7	218	.....	.....	104	.....	.....
24	20	458	7	218	.....	19	146	60	.....
26	13	227	3	70	.....	.....	98	.....	23
28	15	207	2	58	.....	.....	46	28	.....
29	19	321	7	257	.....	.....	134	25	.....
30	7	117	4	148	1	16	94	.....	30
31	19	452	8	251	.....	.....	169	.....	.....
	415	8,561	162	5,682	22	496	3,371	710	130

No. bars repaired 599
No. inches 15,259
No. flanges 130
No. pounds iron 3,371
" " strap rail 710
Days per 1 fire 60 9-10
" " 1 flanges 4 4-10

1928 *T-rail account, December, 1863.*

Dec.	1,	To rep.	21 rails,	20	hours,	70 cents	.....	$14 00
"	1,	"	30 flanges,	10	"	"	.....	7 00
"	2,	"	23 bars,	20	"	"	.....	14 00
"	3,	"	25 "	20	"	"	.....	14 00
"	3,	"	30 flanges,	10	"	"	.....	7 00
"	4,	"	33 bars,	30	"	"	.....	21 00
"	5,	"	28 "	25	"	"	.....	17 50
"	7,	"	23 "	22	"	"	.....	15 40

"	8,	"	26	"	24	"	"	.....	16 80
"	9,	"	32	"	30	"	"	.....	21 00
"	10,	"	19	"	20	"	"	.....	14 00
"	11,	"	24	"	25	"	"	.....	17 50
"	12,	"	25	"	29	"	"	.....	20 30
"	12,	"	6	flanges,	1	"	"	.....	0 70
"	14,	"	26	bars,	27	"	"	.....	18 90
"	14,	"	11	flanges,	3	"	"	.....	2 10
"	15,	"	24	bars,	27½	"	"	.....	19 25
"	16,	"	26	"	30	"	"	.....	21 00
"	17,	"	24	"	30	"	"	.....	21 00
"	18,	"	19	"	27	"	"	.....	18 90
"	19,	"	23	"	30	"	"	.....	21 00
"	21,	"	11	"	12	"	"	.....	8 40
"	22,	"	19	"	20	"	"	.....	14 00
"	23,	"	22	"	22½	"	"	.....	15 75
"	24,	"	28	"	30	"	"	.....	21 00
"	26,	"	16	"	10	"	"	.....	7 00
"	26,	"	23	flanges,	10	"	"	.....	7 00
"	28,	"	17	bars,	10	"	"	.....	7 00
"	29,	"	26	"	28	"	"	.....	19 60
"	30,	"	11	"	10	"	"	.....	7 00
"	30,	"	30	flanges,	10	"	"	.....	7 00
"	31,	"	27	bars,	30	"	"	.....	21 00
									$457 10

1929 *T-rail account, March, 1864.*

Day.	No. bars, ends.	Inches.	E and C.	Inches.	Centers.	Inches.	Lb. iron.	Strap iron.	Fl'gs.
1	16	403	8	274	2	43	168	40	.....
2	16	359	9	317	2	39	142	.....	14
3		Work at blast-pipes.			.....	.....	.....	.....	.....
4		" " " "			.....	.....	.....	.....	.....
5	10	275	7	264	2	50	181	48	.....
7	12	273	9	318	1	26	48	110	.....
8	10	269	9	380	3	67	157	129	.....
9	12	227	16	423	6	185	159	208	.....
10	25	496	8	280	.....	.....	200	103	.....
11	11	333	6	183	.....	.....	156	75	18
12	8	194	9	285	.....	.....	111	115	.....
14	8	174	11	416	5	110	157	164	.....
15	9	221	14	507	3	95	222	151	.....
16	48	671	1	34	.....	.....	47	.....	.....
17	49	647	.....	34	.....	.....	.....	.....	.....
18	31	405	1	35	2	35	.....	.....	.....
19	44	617	1	30	.....	.....	.....	.....	.....
21	13	257	7	223	1	31	141	.....	.....
22	11	238	5	169	2	39	167	.....	.....
23	8	165	11	420	8	188	168	43	.....
24	20	378	7	258	5	107	217	39	.....
25	19	417	8	299	3	74	173	.....	.....
26	6	108	7	249	4	106	136	36	.....
28	18	418	8	238	3	81	355	.....	.....
29	15	329	9	376	4	107	251	.....	.....
30	16	349	6	219	4	77	171	43	.....
31	18	381	15	481	3	59	324	.....	.....
	453	8,594	193	6,732	63	1,519	3,851	1,304	32

Ends	453	bars,	8,594 inches.
Ends, &c	193	"	6,732 "
Centers	63	"	1,519 "
Flanges	32	"	128 "
			16,973

Time, 67 7-10 days. Per 1 fire.

1930 *T-rail, March*, 1864.

March	1.	To repairing	26	bars	30		$21 00
"	2.	" "	27	"	27h		18 90
"	2.	" 14 flanges			3h		2 10
"	5.	" repairing	19	bars	25h		17 50
"	7.	" "	22	"	22½h		15 75
"	8.	" "	22	"	30		21 00
"	9.	" "	34	"	30		21 00
"	10.	" "	33	"	30		21 00
"	11.	" "	17	"	20		14 00
"	11.	" "	18	flanges	5h		3 50
"	12.	" "	17	bars	20		14 00
"	14.	" "	24	"	25		17 50
"	15.	" "	26	"	30		21 00
"	16.	" "	49	"	30		21 00
"	17.	" "	50	"	30		21 00
"	18.	" "	34	"	30		21 00
"	19.	" "	45	"	30		21 00
"	21.	" "	21	"	20		14 00
"	22.	" "	18	"	20		14 00
"	23.	" "	27	"	30		21 00
"	24.	" "	32	"	30		21 00
"	25.	" "	30	"	30		21 00
"	26.	" "	17	"	20		14 00
"	28.	" "	29	"	27½	70c	19 25
"	29.	" "	28	"	30		21 00
"	30.	" "	26	"	30		21 00
"	31.	" "	36	"	30		21 00
			709				

Q. 16. To ascertain from those accounts the number of inches repaired each day, what columns is it necessary to add together?

A. Add together the columns giving the number of inches of
1931 rails repaired on ends; the column giving the number of inches of rails repaired on ends and centers, and the column giving the number of inches repaired on centers only.

Q. 17. What machines were in use when this work was done?

A. Cawood.

Q. 18. Does the book contain any work done on the common anvil? I mean the anvil having grooves but no jaws.

A. No, sir; it does not.

Q. 19. How did the work done in the shop at Turner Junction, on the common anvil, per day, to the fire, compare as to the number of inches with the work shown there, according to the best of your recollection; and what class of workmen were employed on the common anvil as compared with those employed on the Cawood machine?

A. My recollection as regards the amount of work done on the common anvil is made up from what took place on one particular day more than from any account kept as to the number of inches, as we did not keep an account of the number of inches repaired while working on the common anvil.

There was a man by the name of Butters, Thomas Butters, welded a hundred and fifty-two or a hundred and fifty-four inches—I am not sure which, but I am positive as to one of the amounts—in one day, and this was conceded to be the largest day's work ever done in that shop on the common anvil. My recollection is that we made an average of about ninety inches to the fire per day.

The men employed on the common anvil were blacksmiths by trade. Those on the Cawood machine or Whitcomb machine were men that had been helpers in the shop, and acquired a knowledge in that way of repairing rails in that way.

Q. 20. Please state what sort of a workman Butters was; how many helpers he had on that day; whether or not the rails were selected for the purpose; what season of the year it was, and how hard he worked.

A. Butters was a good blacksmith; he had two helpers; the
1932 rails were picked out to do a big day's work; there was either four or five rails only used; I think it was in the month of December; and he worked very hard.

Q. 21. Suppose you were told by any one that he could mend two hundred and forty inches on the common anvil in a day, and do this one day after another, what should you say to that?

A. I should say he was a great deal better man than I ever saw, or a worse one.

Q. 22. Have you ever worked yourself on the common anvil?

A. Yes, sir; I have.

Q. 23. Have you ever mended as many inches in a day as Mr. Butters did on that day you have spoken of?

A. I never did.

Q. 24. Can you mend as many, in your judgment, in a day's work?

A. I don't think I could.

Q. 25. In using the common anvil how many inches could you get on at one heat?

A. About six.

Q. 26. In using the Cawood and Whitcomb machines how many inches could you get on at one heat?

A. I have seen twenty-two.

Q. 27. More than once?

A. Yes.

Q. 28. How many inches of solid welding have you known to be put on in a day on the Cawood or Whitcomb machine in your shop, and who by?

A. I have seen, when working under a contract, in 1860, J. W. Smith put on four hundred and eleven inches, with three helpers a part of the time and part of the time two.

Q. 29. Was this a day's work, in which he endeavored to see how much work he could do?

1933 A. Yes, sir, it was.

Q. 31. Who made the measurement of 411 inches?

A. The foreman of the machine shop, J. D. Johnson.

Q. 32. Was he the person who measured all your work under the contract?

A. He was.

Q. 33. Did you ever experience any difficulty in using the Cawood and Whitcomb machines, in consequence of the jaws cooling the rails, or not?

A. I never did.

Q. 34. How long a time is the rail in the jaws before the patch is welded down onto it?

A. Probably fifty seconds to a minute.

Q. 35. Did you ever have any difficulty with work done on the Cawood and Whitcomb machine, in consequence of the patches scaling off, while you worked for the company, and not including the period while you worked by contract?

A. We very seldom had a patch scale off.

Q. 36. When you worked by contract were you not obliged to make good all rails where the patches scaled off?

A. I was.

Q. 37. Were the rails marked so they could be distinguished?

A. They were; each fire had a stamp, and each patch was stamped in the flange, opposite to each patch.

Q. 38. How many of those rails ever came back in consequence of the patches coming off?

A. I only remember one, and that was after July, 1860.

Q. 39. Where you mended a rail on the flange, did you or not, as a general thing, have occasion to mend that rail on the head also?

A. Well, as a general thing, we did, but there were often times when we did not have to.

1934 Q. 40. After the consolidation of the road into the Chicago & Northwestern Company, did you make reports of your rail-mending?

A. I did.

Q. 41. Who was master-mechanic at the time of the consolidation, and for a period afterwards?

A. Anderson was the general master-mechanic. G. W. Tilton was the master-mechanic of the Galena division most of the time.

Q. 42. Did your reports of the rail-mending go to Mr. Anderson, or you report direct to the accounting department of the road?

A. The shop-reports, together with the reports of rail-mending, were sent to the accounting department on the first of every month.

Q. 43. How often was Mr. Anderson in the habit of visiting your shops at Turner's Junction, during the time he was general master-mechanic?

A. Well, I don't think it was oftener than once in three months.

Q. 44. Were any of the rails from the Wisconsin division which had been mended on the common anvil ever brought to your shops?

A. I think I have noticed some that came there since the 1st day of July, '71. None before, though.

Q. 46. State whether or not you ever observed that the work on those rails was better done than the work on the Cawood block?

A. I never noticed that the work was better done. I never paid much attention to them any way.

Q. 47. Mr. Anderson told us that, in his judgment, they could do a sounder job on the plain block, and gives as his reason that in patching rails on the jaw-block you have to trim off the top, which makes the edges thin so that they cool quickly, but on the plain block you
1935 put the piece on the top, weld it on, then turn the rail on its side, and weld up the thin edge. Is this judgment as to the quality of the work on the respective blocks in accordance with your own, as de-

rived from your experience with the common blast and the Cawood and Whitcomb blocks?

A. No; that is not, I think.

Q. 48. Whether or not, for a period, you used in your shops both the common anvil and the Cawood at the same time?

A. I did.

Q. 49. Was the man who worked on the Cawood block at that time, a practical blacksmith?

A. He was not.

Q. 50. Whether or not you subsequently abandoned all use of the common anvil for mending rails, and employed only the Cawood and Whitcomb machines?

A. We did.

Q. 51. State whether or not a person who has had experience in mending rails would have difficulty in distinguishing a rail mended on the Bain machine from one which was mended on the Cawood or Whitcomb machine.

A. Could distinguish very readily.

Q. 52. Whether or not there is a difference in the shape of the patch, and its appearance at the side of the rail?

A. There is a difference in the shape of the patch, and a difference in the shape of the rail when completed.

Q. 53. Can a rail mended on the common anvil be distinguished from either; and, if so, how does it differ in appearance?

A. It can be distinguished from either; the difference in appearance is the short patches show themselves on the sides of the rail, and the rail lacks that smoothness that it has under the other manner of repairs.

Q. 54. Is there any change in the configuration of the rail after it has been mended on the common anvil?

1936 Yes, to a certain extent; the rail becomes thicker by the upsetting process, in the shank.

Q. 55. Have you sometimes cut rails?

A. Yes, sir.

Q. 56. Whether or not, as a general thing, the rails you cut at one end were mended at the other end or in the center of the same rail?

A. As a general thing we did not do much mending on rails that we cut.

Q. 57. What proportion of the whole number of rails you worked upon should you say you cut, and didn't mend at all?

A. Probably one in fifteen; it is a very hard thing to get at, and that is merely a matter of judgment, and I have no data really to form an answer to that question from.

Q. 58. What sort of rails did you cut off and not mend at all; as to the condition of the rail, I mean?

A. A rail that was split in the shank at one end we would cut; if the other end was good, wouldn't require it at all.

Q. 59. Where you cut rails, did you make a charge of it on your reports if you did no mending upon it at all?

A. At times we did; at times we did not.

Q. 60. When did you?

A. I think we did in '63 and '64, and charged six inches for cutting, and also when under contract-work.

Cross-examination by Mr. Jewett:

X. Q. 1. How many times have you been heretofore examined as a witness in the cases in which Mr. Turrill has been a party, either

plaintiff or complainant, in relation to the matter of mending railroad-rails?

A. Twice certain, and I don't know but three times; I am not positive about it; once in open court at Detroit and once in Chicago, and
1937 I don't know but twice here; I am not positive about it; I have been annoyed a good deal by Mr. Turrill's rail-suits.

X Q. 2. Were you examined once in open court in relation to these matters in Chicago?

A. I was examined in open court in regard to a suit between the Michigan Southern Railroad and Mr. Turrill.

X Q. 3. I ask you in Chicago; the Michigan Southern case was at Detroit.

A. I think not.

X Q. 4. You have been called on each of these several occasions as a witness for Mr. Turrill, have you not?

A. I think I have.

X Q. 5. Wer'n't you called in the case of Turrill vs. Illinois Central Railroad Company to testify in open court in relation to a machine which gave no bottom support to the rails?

A. I think I was called once to give my testimony in regard to a Mason & Davis machine that did not give a bottom support.

X Q. 6. Was not that in Chicago?

A. In Chicago; yes, sir.

J. H. LAKEY.

MONDAY, *December* 21*st*, 1873.

Counsel present as before.

MICHAEL ARNOLD.

Q. 1. Please state your name, age, residence, and occupation.

A. Michael Arnold; age, 42; residence, Concord, N. H.; occupation, blacksmith.

Q. 2. State whether you have ever worked at patching rails on a common anvil or block containing grooves, on which the rail is laid to be side swaged.

A. I have.

Q. 3. Where, how long, and for what railroad companies have you done such work?

1938 A. I worked in Concord for the Northern Railroad Company for about three years; for the Concord, Manchester & Lawrence Railroad Company about twelve years, also in Concord.

Q. 4. When you worked for the Northern Railroad Company, how many fires were there in the shop, and who had charge?

A. There were four fires in the shop, and we were under the charge of the master mechanic, James Ledgerly, and the road-master, Mr. Bailey, at that time.

Q. 5. Did you have charge of a fire?

A. Yes, sir.

Q. 6. Did you keep an account of the number of rails mended per day, and return it to the company?

A. Yes, sir.

Q. 7. Will you please state, as nearly as you can, the average number of rails you mended per day at your fire while you worked for that company.

A. Well, sir, as near as I can judge, from seven to ten rails a day.

Q. 8. State, if you please, the average number of inches you were accustomed to mend per rail while you worked for that company.

A. Well, about, I should judge, between eight and ten inches to a rail.

Q. 9. How did the amount of work turned out per day at your fire compare with the amount of work done by the other workmen at the other fires in the shop?

A. Well, if I wasn't over them any, I wasn't less than any of them at those fires.

Q. 10. Where did you learn your trade?

A. In Concord, sir.

Q. 11. Have you worked for the railroad companies at any other branch of blacksmithing than repairing rails? If so, how long?

1939 A. I have, sir. Probably three years doing general freight-work and bolt-making.

Q. 12. During the years you worked for the Concord, Manchester & Lawrence Road, did you keep an account of the number of rails mended per day at your fire?

A. Yes, sir.

Q. 13. How did your work for that road, per day, compare with your work for the Northern Road, as to the number of rails per day, and number of inches per rail?

A. I should judge about the same.

Q. 14. State, if you know, how many inches of solid welding you could and did put on at one heat.

A. Well, I should judge the longest heat I could take would be six inches to a heat.

Q. 15. When you welded five or six inches at a heat, were you, or not, obliged to take a second heat in order to finish up the rail?

A. Yes; if I had a piece of six inches to put on to a rail, it would be necessary for me to take three heats—one heat to scarf the rail, the two other heats for to finish the rail.

Q. 16. When you were at work for these companies, was it a common practice with you to cut off rails and not mend them at all?

(Objected to.)

A. No, sir.

Q. 17. When, if at all, did you cut off any rails?

A. Occasionally when the yard-men, when there was so many connections in the yard, they wanted a rail to go in between the head-block and the frog, we would cut it off; or otherwise, when the rails would break off so it had to be cut off; say if a 24-foot rail was broke so it couldn't be mended, we would cut it down to a 21-foot rail.

Q. 18. Take a hundred rails, out of that number as they came

1940 to the shop, what proportion should you say you cut off because the head was broken and they had to be cut off?

(Objected to.)

A. Well, probably they would average between one and two to a hundred; not over that to a hundred rails.

Q. 19. Do you know Albert T. Shaw?

A. Yes, sir.

Q. 20. Do you remember to have ever seen him in the rail-mending shop at Concord when you worked for the Northern Road?

A. No, sir.

Q. 21. State, if you know, what position he first held on that road.

A. A division-master, I believe, of the road.

Q. 22. Is that the same as what is sometimes called road-master?

A. Yes, sir.

Q. 23. What position did he afterward hold on that road, if you know, and how was he addressed?

A. Assistant superintendent.

Q. 24. Was he, or not, ever chief engineer of that road?

A. Not as I ever knew, sir, nor any other man in that capacity of office on the road.

Q. 25. When Shaw was assistant superintendent, who was superintendent over him?

A. George E. Todd.

Q. 26. Did Shaw hold any other position than those of road-master and assistant superintendent; and how lately did you know of him as assistant superintendent of that road?

A. As to holding any other positions on the road, I believe he had charge of seeing to the bridges on that road for a time, seeing that they were all in order. That was recently, here, that I knew him to be assistant superintendent—this past summer; right along for the
1941 last six years at least he held that position, or might be more.

Q. 27. What wages did you get when you worked for the Northern Road; and what when you worked for the Concord, Manchester & Lawrence?

A. Well, part of the time the wages ranged differently in years. The Northern paid $1.50; the Concord Company, $2.50.

Q. 28. What wages did the helpers get on those roads?

A. Well, all the way from a dollar to a dollar and sixty-seven during these years.

Cross-examination by Mr. Jewett:

X Q. 1. When did you reach Chicago?

A. Yesterday morning at about half-past eight o'clock.

X Q. 2. Who requested you to come out?

A. I believe by notice from Mr. Turrill here.

X Q. 3. Did you ever see Mr. Turrill, except in Chicago?

A. Yes, sir.

X Q. 4. Were, and how many times?

A. In Concord once, in about '68 or '69; I couldn't say.

X Q. 5. Did you have any conversation with Mr. Turrill at that time on the subject of rail-mending?

A. Yes.

X Q. 6. You came out here at this time, if I understand you, upon the strength of a letter received from Mr. Turrill; is that so?

A. No, sir. I received no letter from Mr. Turrill myself in person.

X Q. 7. Explain, then, in what way you received your invitation to come here.

1942 A. By a gentleman, I believe, instructed by Mr. Turrill to find me out in Concord, and if I was, that he wanted me in Chicago.

X Q. 8. Who was that gentlemen?

A. His name was Wortman, I believe; Mr. Wortman.

X Q. 9. What is your business now?

A. Carriage business, sir.

X Q. 10. When did you quit railroading?

A. About three years ago.

X Q. 11. The iron was pretty badly damaged upon these roads that you mended rails upon, wasn't it, when it came into the shops for repairs?

A. I don't know about it being very much damaged.

X Q. 12. Have you ever examined the iron in use upon other railroads, so as to be able to state a comparison between the iron upon the roads you have mentioned and other roads?

A. Well, I looked it over some.

X Q. 13. Well, was the iron you welded upon these roads in about the same condition as the iron carried to the shop to be mended upon other roads?

A. Much about the same, as I could see along. I could not see much difference.

X Q. 14. Did you ever try to mend iron upon any machine which had jaws for holding the iron whilst it was being mended?

A. I believe I did.

X Q. 15. When was it?

A. I could not exactly state the year.

X Q. 16. Where was it?

A. In Concord, for the Concord Company.

X Q. 17. About how long ago do you think that was?

A. It may be '65 or '66, or along there or thereabouts.

X Q. 18. What kind of railroad-iron did they use upon the Northern Road and the other road you have mentioned?

A. "T" rail.

1943 X Q. 19. What was the weight of it?

A. I couldn't exactly state the weight of the rails; they varied; some would be a heavy pattern of iron and some of light.

X Q. 20. What was the dimensions of the iron you used for patching rails?

A. 2½ and 2¼ by ½ inch and ⅝ inch thick.

X Q. 21. How long would it take you to take the three heats which you say you always did in putting on a patch six inches long; I mean, how long would you have iron in the fire for that purpose?

A. Oh, probably it would take over half an hour to finish it; upwards of half an hour, more or less.

X Q. 22. Do you mean that it would take a "half-hour, more or less," to do the mere heating of the iron, or do you mean that it would take that time to complete the patch?

A. The completing of the patch.

X Q. 23. Now please state your best judgment as to the time required to put on the end of a rail a patch six inches long. State it without any "more or less" to it.

A. I couldn't give any definite answer to that, how long it would take me.

X Q. 24. How long, in your judgment, does it require, in a fire such as you used at Concord, to bring a railroad-bar to a welding heat?

A. Well, to the best of my judgment, (I suppose I can go on that,) probably from 10 to 15 minutes.

X Q. 25. What kind of a fire did you use there?

A. An open fire and fan-blast.

X Q. 26. How long would it ordinarily take you, after the rail and the patch are heated to a welding-heat, to accomplish the welding of the two parts together, so far as that was accomplished by hammering upon the top of the patch, supposing the patch to be six inches long?

1944 A. Well, to the best of my judgment, in five minutes, more or less.

X Q. 27. Which part of the process, as you carried it on, do you think occupied the more time, the heating or the welding?

A. The heating.

X Q. 28. Did you never put on a patch as long as six inches and finish it up at one heat?

A. I don't know; I guess not.

Redirect examination, by Mr. Curtis:

Q. 1. You say you have tried to mend iron on a machine which had jaws for holding it. What success did you meet with when you tried it, and was the rail mended better than or not so well as on the common anvil?

A. I think it looked better, sir; very good success.

Q. 2. Did it take as long, or not so long, as on the common anvil?

A. Well, that I don't know exactly; I didn't keep any time whether I done it any quicker, because it was the only rail I ever done on it, and if I have any experience on it I may do better.

Q. 3. State whether or not the machine was afterwards put to use by the company at Manchester, and whether you saw it there.

A. Yes, sir.

MICHAEL ARNOLD.

MONDAY, *December 22d*, 1873.

Present: Walter Curtis, esq., of counsel for complainant; the complainant, in person; John N. Jewett, John B. Niles, R. Biddle Roberts, and George Payson, esqrs., of counsel for defendants; and the witness below named.

1945 L. J. MOREHOUSE, a witness recalled on behalf of the defendants, being first duly sworn, was cross-examined by Mr. Curtis, and deposes and says as follows:

X Q. 1. Will you please state whether the statement of work done by the Illinois Central Railroad, prepared by you for the solicitor of that road, as you told us the other day, was prepared solely from these reports which Mr. Jewett handed me, running from 1860 to 1869?

A. That statement was prepared several years ago. My recollection is that it was prepared from these papers.

X Q. 2. Were there not monthly reports made by the division engineers, and sent into the office?

A. For a portion of the time there were. I do not remember during what years these monthly reports were made.

X Q. 3. During the earlier or the later portion of the time covered by the accounts?

A. Monthly reports were made during the later portion of the time covered by these accounts.

X Q. 4. Do you know where those monthly reports are?

A. I suppose they were most of them burned up in the Chicago fire: I don't know.

X Q. 6. You have not seen them since the fire?

A. I have not looked for them; have not had occasion to; I think some of them may still be in existence.

X Q. 7. Will you make search for them, and if they are in existence, hand them in here during the week, those prior to September 9, 1870?

A. Yes, I will do so, certainly.

X Q. 8. Note whether the entries upon these yearly reports, from '60 to '69 were transcribed into any books of the company—anything from them.

A. Some of them were.

X Q. 9. Why not all?

1946 A. The manner of keeping the accounts has varied in different years.

X Q. 10. Were there any years, so far as you know, when no accounts were kept of the rail-repairing done, except in the form of those loose sheets of reports?

A. There were some years when no other accounts were kept in the office of the chief engineer.

X Q. 11. Were there accounts kept at that time in any department of the road other than these reports?

A. Accounts were kept by the different division engineers other than these accounts. I can't tell you how the division engineers kept their accounts, whether in books or on loose sheets.

X Q. 12. What I desire to ascertain is, whether there were any books kept in the general office of the company here in Chicago, on which entries were made in reference to this general matter of repairing rails.

A. I understand that to be a repetition of the question which has been asked before. All the rail-mending of the road was in the general charge of the engineer department; but the Weldon shop, which was in general charge of the machinery department of the road, did some rail-repairing, the expense of which was charged by that department to the engineer department, and that expense, as furnished by the machinery department, appears in these reports. Witness has no knowledge of what appears in the books of the machinery department except as appears from the result of work done in that department, reported to the engineer department. The reports from the Welden shops come to the chief engineer's office from the machinery department, through the division engineer, in the same manner as from the other shops through the division engineer's department. All the entries which appear on the books in the general offices of the company relating to rail-mending, appear on the books in the engineer's office.

1947 X Q. 13. I find reports from the Weldon shop, from 1861, and including that year, but do not find any for the year 1860, during which period the answer states there were two machines at that shop. Do you find any statement yourself of the work at that shop for 1860 on that report; and, if not, can you tell me why no such statement was made?

A. I could find no statement of the work at the Weldon shop in the year 1860; there is nothing on record. I presume that no account was rendered. I do not know why no statement was made. At the time of making up these reports I endeavored to get the statement of the rail-mending of that year from the Weldon shops, and could not get one.

The following interrogatories are put de bene esse.

X Q. 14. Will you please examine all these reports, and state the number of bars you find reported as mended from each shop, for each year; the number of inches you find reported as mended for each shop, during each year; the number of bars you find reported as cut, and distinguished in the reports from those which are reported as mended, and not including, in this latter collection, any reports which return the rails under the terms "mended and cut" without distinguishing as to how many were mended and how many cut. If the number of inches cut appears upon any of the reports where cut rails are specifically designated, or if you find any entries upon those reports showing at what number of inches per bar the cut rails had been calculated in making up any report of inches contained anywhere in said reports, please to point out what you find on the subject in your reply.

To give the witness time to prepare an answer to this question, his further cross-examination is adjourned to Wednesday morning, the 24th inst., at 10 o'clock a. m.

WEDNESDAY, *December 24th*, 1873—10 a. m.

Pursuant to adjournment. Present, as before.

Cross-examination of L. P. Morehouse resumed.

A. I submit these tables in answer to the question.

1948 *Rails repaired at Weldon shop.*

1861	428 bars,	equal	12,988	inches.	Report does not state whether any cut bars are included.
1862	521 bars,	equal	15,799	inches.	Report as in 1861.
1863	1,314 "	"	34,054	"	"
1864	675 "	"	16,726	"	"
1865	972 "	"	21,461	"	"
1866	1,196 "	"	24,608	"	"
1867	842 "	"	17,869	"	"
1868	613 "	"	13,936	"	"
1869	698 "	"	14,882	"	"

Rails repaired at Champaign shop.

1861	545 bars,	equal	14,048	inches.	Report does not state whether any cut bars are included.
1862	1,550 bars,	equal	41,718	inches.	Report as in 1861.
1863	4,020 bars, aver.	23.77	inches per bar.		"
1864	4,372 bars,	equal	88,930	inches.	"
1865	4,674 "	"	86,529	"	"
1866	10,154 "	"	164,216	"	"
1867	9,163 "	"	132,298	"	"
1868	8,332 "	"	123,397	"	Includes all cut bars. A bar, cut, is called 6 inches, welded.
1869	3,018 bars,	equal	43,306	inches.	Includes all cut bars.

Rails repaired at DuQuoin shop.

1861	1,058 bars.	Report does not state whether any cut bars are included.			
1862	2,325 bars.	Report as in 1861.			
1863	1,228 bars,	equal	18,231	inches.	Report as in 1861.
1864	1,652 "	"	26,313	"	"
1865	648 "	"	9,818	"	"
1866	3,132 "	"	42,586	"	"
1949	1867. 5,124 bars,	equal	71,873	inches.	Includes 796 cut bars.
	1868. 3,972 "	"	55,804	"	" 391 "
	1869. 529 "	"	6,990	"	" 148 "

Rails repaired at Jonesboro' shop.

1868.	3,867 bars,	equal	57,318	inches.	Includes 760 cut bars.
1869.	977 "	"	15,354	"	" 125 "

Rails repaired at Centralia shop.

1868.	2,130 bars,	equal	24,738	inches.	Includes 483 cut bars.
1869.	424 "	"	4,800	"	" 60 "

Rails repaired at Dubuque shop.

1868. 2,530 bars, equal 53,440 inches. Report does not state whether any cut bars are included.

Rails repaired at Dyersville shop.

1869. 2,546 bars, equal 50,040 inches. Report does not state whether any cut bars are included.

Rails repaired at Vandalia shop.

1866. 1,597 bars, equal 15,636 inches. Report does not state whether any cut bars are included.
1867. 2,891 bars, equal 22,560 inches. Includes 755 cut bars.
1868. 3,899 " 48,894 " " 407 "
1869. 1,181 " 14,916 " " 90 "

Rails repaired at Decatur shop.

1866. 933 bars, equal 9,384 inches. Report does not state whether any cut bars are included.
1867. 2,835 bars, equal 26,695 inches. Includes 976 cut bars.
1868. 5,658 " 62,337 " " 754 "
1869. 1,246 " 16,139 " " 118 "

1950 *Rails repaired at Forreston shop.*

1865. 3,063 bars, equal 58,660 inches. No bars included that were only cut.
1866. 3,381 " 64,709 " " " "
1867. 4,291 " 59,001 " " " "
1868. 4,140 " 61,487 " " " "
1869. 1,114 " 16,933 " " " "

Rails repaired at El Paso shop.

1865. 169 bars, equal 2,390 inches. Report does not state whether any cut bars are included.
1866. 3,201 bars, equal 46,173 inches. No bars included that were only cut.
1867. 3,504 " 44,857 " " " "
1868. 4,210 " 44,977 " Includes 701 bars cut. A bar cut is reckoned as 6 inches welded.
1869. 1,813 bars, equal 19,099 inches. Includes 158 bars cut. A bar cut is reckoned as 6 inches welded.

Rails repaired at La Salle shop.

1860. 252 bars. Report does not state whether any cut bars are included.
1861. 1,376 bars, equal 22,407 inches. Includes 109 bars cut only, and not repaired. Up to Sept. 1st, rails cut were rated as 6 inches welded; after Sept. 1st, as 4 inches.

1862.	521 bars,	equal	8,358	inches.	No bars included that were only cut.
1863.	267	"	4,219	"	" " "
1864.	626	"	14,003	"	" " "
1865.	1,299	"	28,559	"	" " "
1866.	1,008	"	18,571	"	" " "
1867.	2,549	"	57,070	"	" " "
1868.	2,932	"	51,067	"	Includes 1,064 cut bars. A bar cut is reckoned as 6 inches welded.
1869.	1,572 bars,	equal	23,727	inches.	Includes 552 cut bars. A bar cut is reckoned as 6 inches welded.

1951 *Rails repaired at Nora shop.*

1861.	3,055 bars,	equal	54,156	inches.	Includes 289 bars cut only and not repaired.
1862.	2,942	"	49,299	"	No bars included that were only cut.
1863.	2,843	"	48,404	"	" " "
1864.	2,810	"	55,775	"	" " "
1865.	3,262	"	62,849	"	" " "
1866.	3,100	"	54,891	"	" " "
1867.	3,741	"	48,828	"	" " "
1868.	3,995	"	45,389	"	Includes 1,003 cut bars. A bar cut is reckoned as 6 inches welded.
1869.	1,967 bars,	equal	21,576	inches.	Includes 438 cut bars. A bar cut is reckoned as 6 inches welded.

Rails repaired at Galena shop.

1861.	2,777 bars,	equal	29,156	inches.	Includes 537 bars cut only, and not rep'd.
1862.	3,047	"	42,433	"	No bars included that were cut only.
1863.	3,179	"	49,135	"	" " "
1864.	2,217	"	38,915	"	" " "
1865.	2,468	"	38,116	"	" " "
1866.	3,291	"	57,552	"	" " "
1867.	3,517	"	61,204	"	" " "
1868.	3,212	"	58,488	"	Includes 88 cut bars. A bar cut is reckoned as 6 inches welded.
1869.	1,759 bars,	equal	31,376	inches.	Includes 176 cut bars. A bar cut is reckoned as 6 inches welded.

X. Q. 15. State, if you please, whether any, and, if any, how many, of the bars you have put down here as reported as cut bars were not included in the statement which you prepared for the counsel of the Illinois Central Railroad Company, and which was embodied in the answer and placed before the master.

1952 A. I think that all the bars reported as cut here were included in that statement.

X. Q. 16. Did you include in that statement the bars cut at the El Paso, La Salle, Nora, and Galena shops in the year 1869?

A. The statement for '69 appears to have been made by me from the report of rails repaired on the whole road, as filed in the office of the chief engineer. That report was not made by me, and I merely copied

it from the statement so filed, which is for the whole year, and which purports to include all the bars cut, as well as repaired.

X. Q. 17. Did the statement furnished by you to the counsel include the number of bars cut at the El Paso, La Salle, Nora, and Galena shops, for the year 1868? I see that the reports for that year have no general summary.

A. Yes.

X. Q. 18. Did the statement you furnished the counsel for the year '67 contain the cut rails at Galena among the repaired rails, and those at Nora and La Salle?

A. It did not.

X. Q. 19. Did it contain the cut rails at Du Quoin, Vandalia, and Decatur for that year?

A. It did.

X. Q. 20. Did the statement you furnished the counsel for the year 1866 contain the cut rails, what is called upon the report the second division, El Paso, La Salle, Forreston, Nora, and Galena?

A. It did not.

X. Q. 21. Did the statement furnished counsel for 1865 contain any rails reported as cut at La Salle, Forreston, Nora, and Galena?

A. It did not.

X. Q. 22. Did the statement furnished for '64 contain any rails reported as cut at Galena, La Salle, and Nora?

1953 A. It did not.

X Q. 23. How was it in regard to the statement for '63; did that include any rails cut for La Salle, Nora, and Galena?

A. It did not.

X Q. 24. Were any rails reported cut included in the statement you furnished counsel for the year 1862?

A. At the Du Quoin shop, cut bars were included; at Weldon shop; at Champaign shop.

X Q. 25. Please answer the same question for the year 1861.

A. Cut rails were included at Weldon shop, Champaign shop, Du Quoin shop, La Salle shop, Nora shop, and Galena shop.

X Q. 26. How many were reported that year as cut from the Weldon shop?

A. Cut rails were never reported separately from the Weldon shop.

X Q. 27. Perhaps, then, you have not exactly understood my questions. These inquiries I have been making relate to rails reported as cut; not to reports which do not specify cut rails; do you wish, in view of this explanation of my questions, to make any changes in any of your answers?

A. My statement for '62 did not include any bars which were reported specifically as cut bars.

X Q. 28. How was it about the report for the year 1861?

A. The statement for 1861 includes rails specifically reported as cut at Galena shop, Nora shop, and La Salle shop.

X Q. 29. Did the statements furnished counsel for the years '66, '65, and '64 contain any rails specifically reported as cut rails?

A. They did not.

X Q. 30. If I understand you correctly, where the reports do not contain any specific report of cut rails, you understand that if any

1954 rails were cut during the year at the shops reported from, they were returned in the reports under the term mended rails, and under the terms mended and cut, in one or two instances; am I right?

A. Yes.

X Q. 31. Please explain why, during some years, rails reported as cut were not included in the statement, and during other years they were included in it?

A. Where the expense of cutting rails was kept as a separate item, cut bars were not included; where the expense of cutting was not kept as a separate item, the cut bars were included in the statement, as the statement called for the expense of welding rails, and we had no means of giving the expense without including these cut bars.

X Q. 32. Have you found any of the monthly reports in regard to which inquiry was made on Monday. If so, will you please produce them?

A. I have found some; here they are.

Redirect examination.—B.

X Q. 1. So far as the reports to which you have referred specifically designate cut rails, do they indicate the number of cuts per rail?

A. They do not.

X Q. 2. Aside from those rails specifically reported as cut, do not the reports show, in some cases at least, that other rails were cut which were included under the general designation of repaired rails, or mended rails, or mended and cut?

A. Some of the reports for some years show that.

X Q. 3. Do you of your own personal knowledge know that in some of those shops, at least, from which the reports do not make any distinction between cut rails and mended rails, rails were actually cut without being otherwise repaired?

A. I know such was the case.

1955 X Q. 4. Are you able to give any judgment, based upon your own observation or knowledge, as to the number of such rails?

A. I have no personal knowledge of the number cut at any shop.

L. T. MOREHOUSE.

TUESDAY, *December* 23, 1873.

Present: Walter Curtis, esq., of counsel for complainant; the complainant in person; John N. Jewett, John B. Niles, R. Biddle Roberts, and George Payson, esqrs., of counsel for defendants, and the witness below named.

THOMAS E. WORTMAN.

Q. 1. Please state your name, age, residence, and occupation.

A. Thomas E. Wortman; age, thirty-eight; residence, Boston; occupation, in the employ of the Freeman's National Bank, as special officer, for the past year.

Q. 2. State whether or not you recently visited Franklin and Canaan, New Hampshire, on the line of the Northern Railroad, at the request of the plaintiff, and had interviews with A. J. Peabody, Edward Berry, and Dennis Countey with reference to work they had done in mending rails on the line of that road.

A. I have with all except Countey. Countey I did not converse with. I saw him.

Q. 3. State whether or not you also visited Wilmington, Lowell, and Woburn, all in Massachusetts, on the line of the Boston, Lowell, & Nashua Road, and had interviews with William H. Putnam, Edward Doherty, and Michael Burns upon the same subject, and also at Mr. Turrill's request.

A. I have.

Q. 4. Whether or not you examined the book of Mr. Burns, in which the rail-mending was set down.

1956 A. Well, I can tell you by referring to my notes; its mixed up some; I did, sir.

Q. 5. Whether or not you transmitted to Mr. Turrill the statements made by these men on the subject of the work they had done in mending rails.

A. I did.

Q. 6. State whether or not you subsequently, at the request of Mr. Turrill, called upon Mr. Winslow, the superintendent of the Boston & Lowell Railroad, for permission for Putnam, Doherty, and Burns to come to Chicago and testify on behalf of the complainant in this cause without incurring discharge from the road; and, if so, with what result.

(Objected to as incompetent and as hearsay.)

A. I did, sir; with a point-blank denial.

Q. 7. State whether or not you also called upon George E. Todd, superintendent of the Northern Railroad Company, and made a similar request with reference to A. J. Peabody, Edward Berry, and Dennis Countey; and, if so, with what result.

A. I did, sir; with the same result; a point-blank denial.

(Question objected to for the same reason as before.)

Q. 8. State whether or not you yourself witnessed any rail-mending at Canaan, Woburn, and Wilmington; and, if so, what you saw.

A. I did, sir. I saw them. I was in the shop nearly half a day at Canaan. They were running three fires, working on the common anvil, or creased anvil. I called at Woburn, was in the rail-mending shop there, and saw them at work. Saw the day's work that they had done the day before. It was there on a car in the shop. It was four rails that was patched. I put a square onto them and measured them, out of curiosity to myself. One of them measured 26 inches; one 18; one 14; one 11¼ to 12 inches. I called it 12 inches; it was a little scant.

1957 Saw several other rails there that were mended with a very short piece on them; some 4 to 6 inches and some with a little dowel piece put on the end. At Wilmington I was also in the shop and saw them mending rails. I was in the shop there, I should think, about two hours. One fire there. Saw them to work. Think they were finishing one rail when I went in and patched one while I was there. I don't know of anything, unless you want to know how they were at work, and how much they put on, etc. They put on small patches; took 5 or 6 inches to a heat.

Q. 9. Did you observe the number of rails repaired during the time you were in the shop at Canaan, N. H.?

A. Yes, sir.

Q. 10. How many were got out?

A. I believe that there were seven on the car that they had done that forenoon; some were finished when I went in; they were running three fires; put out one while I was there on account of one of the men being called home to a sick family. They had 18 rails on the car which they had run in for the day's work, which they considered was a fair day's work for three fires.

(Objected to as hearsay.)

Cross-examination by Mr. Jewett:

X Q. 1. You say, in describing yourself or your business, that you have been the special officer of the Freeman's National Bank for the past year. What are the duties of that position?

A. To look after the interest of the bank.

X Q. 2. In what respect?

A. For its safety against fires since the large fire in Boston, and other business, such as may devolve upon me.

X Q. 3. Are you merely what is termed a watchman about the building, or have you duties of a detective character connected with your employment?

1958 A. Well, as watchman, not about the building, but in the bank, and outside business. Don't know as you can call it detective business. When a party is required to look after parties interested in the bank I have done so, and other business besides.

X Q. 14. What I desire to get at, Mr. Wortman, is your exact position in the bank, which none of your answers enables me to determine. Please state what it is.

A. Well, sir, to be at the bank at the closing, to see that everything is all right and safe; the bank has been situated temporary since the fire, and I have been employed to be present at the time that the bank was closed, to see that everything was all right, and to see that it was so through the night; in case of fire to take care of the books and property the best way I could.

X Q. 15. Do you still retain that position?

A. I do not, at the present time. I will not go back to it; they have moved into a building permanent now, and have vaults and a burglar-alarm, so that they do not require any one's attention to it.

X Q. 16. Do you know how you happened to be selected for any service in connection with this case?

A. I do not, sir.

X Q. 17. Did you ever know Mr. Turrill before you came out to Chicago this time?

A. I did, sir; I made his acquaintance when I was here last fall.

X Q. 18. Through whom did you make his acquaintance, or in what manner?

A. Through Mr. Curtis, at the hotel where I was stopping.

X Q. 19. How long since was it that you were requested to visit the places you have referred to in your direct examination?

A. The 27th day of November.

1959 X Q. 20. How were you requested, by letter or verbally?

A. By letter from Mr. Turrill.

X Q. 21. When were you at the shops of the railroad company at Franklin and at Canaan?

A. December the 4th I was at Franklin; December the 5th at Canaan.

X Q. 22. Do you know, practically, anything of the matter of rail-mending?

A. Only what I saw done while I was present in the shops.

X Q. 23. You have never practically been engaged in mending rails, or working in iron in any form, have you?

A. Not railroad iron.

X Q. 24. Did you know anything respecting the quantity of iron mended in any day in any of the shops which you visited, beyond what was told to you by some person you met there, excepting what you actually saw being done whilst you were in the shop?

A. My experience was from personal observation in the shop, and from the amount in figures done, which I took a copy of from their books, which they told me was returned to the company monthly. While in conversation with some of the parties in the shop, speaking of the amount of work being done, Mr. Burns, of Woburn, cited to some

rails in the shop that he had done previous, and spoke of the unusually large patch he had put on to one rail, and that caused us to take the square and measure it and the other rails which were there at the same time.

(Answer objected to as not called for by, and not responsive to, the question.)

X Q. 25. Will you now please answer the question?

Question repeated.

A. Only what I saw done with my own eyes, and what I took from their books.

1960 X Q. 26. Did you know, independently of what you were told by some person present, that the books which you have referred to contained any account of rail-mending?

A. Only what the foreman of the shop told me.

(A general objection is entered by the defendants to as much of the witness' testimony as relates to what was told him while he was in the shops, and to all conversations and results of conversations between him and other persons, as being hearsay, and therefore incompetent.)

THOMAS E. WORTMAN.

WEDNESDAY, *December 24th*, 1873.

Present: Walter Curtis, esq., of counsel for complainant; the complainant in person; R. Biddle Roberts, John N. Jewett, John B. Niles, and George Payson, esqrs., of counsel for defendants, and the witness below named.

DAVID H. WILLIAMS.

Q. 1. Please state your name, age, residence, and occupation.

A. David H. Williams; age, 54; residence, Alleghany, Penn.; occupation, civil engineer.

Q. 2. State whether or not, during the year 1858, you mended any rails, or had a contract for mending any rails, with the Pittsburgh, Ft. Wayne & Chicago Railroad Company.

A. I had.

Q. 3. Did you, yourself, carry on work under this contract, or did you sublet it?

A. Well, I virtually carried it on myself; I sublet a portion of it.

Q. 4. At what rate per inch did you sublet such portions as you did sublet, for patches of 12 inches or less?

A. What we called 12 inches I sublet at 36 cents; 14 inches, and under, we called 12 inches.

Q. 5. At what rate did you sublet work from 14 to 26 inches?

1961 A. Sixty-five cents.

Q. 6. On what machine was the work done?

A. It was done with a Cawood machine, as made by Whitcomb, of Cleveland.

Q. 7. How many fires did you run?

A. I run three fires most of the time.

Q. 8. When you speak of subletting at those rates, what was included besides labor, if anything?

A. It included the coal and the iron, and the small hand-tools, such as hammer, etc.

Q. 9. How long did you have the contract?

A. My contract was drawn for a year, but I didn't work so long under it.

Q. 10. If you have any memorandum from which you can tell the

amount of work turned out at the two fires, or at one fire for the month' of May and June, '58, will you turn to it and tell us what it was, the number of rails and inches included per day?

A. This memorandum is part of it; work done at two fires, and part of it at one. I have a daily memorandum here:

May, 1858.

May	1st,	13	rails,	550	inches, at Wooster.
"	3d,	18	"	487	" "
"	4th,	14	"	474	"
"	5th,	15	"	567	"
"	6th,	12	"	608	" two fires.
"	7th,	27	"	719	" "

The seventh there were two fires, and I should think the day before; prior to that I should think there was only one, but there is nothing here to indicate it. When there was not many rails to repair they only run one fire; on other occasions they run two.

	May	8th,	10	rails and 543	inches.
	"	10th,	18	" 606	"
	"	11th,	14	" 351	"
1962	May	12th,	14	rails and 598	inches.
	"	13th,	17	" 662	"
	"	14th,	32	" 920	"
	"	15th,	28	" 810	"
	"	17th,	20	" 620	"
	"	18th,	14	" 661	"
	"	19th,	37	" 966	"
	"	20th,	28	" 908	"
	"	22d,	14	" 302	"
	"	24th,	22	" 800	"
	"	25th,	27	" 774	"
	"	26th,	14	" 548	"
	"	27th,	30	" 786	"
	"	28th,	20	" 448	"
	"	29th,	30	" 854	"
	"	30th,	30	" 800	"

Q. 11. Perhaps that is sufficient, Mr. Williams, without troubling you to go through the month of June. Please state how many fires there ever were at the shop at Wooster, at any one time, where this work was done.

A. There were never but two fires running that I remember, at any one time.

Q. 12. Where else was work done under that contract?

A. At New Brighton.

Q. 13. Have you ever seen patches that have been put on on the common anvil?

A. I have seen a few.

Q. 14. What standard of workmanship did the company require from you under your contract, as compared with common anvil work?

A. They required a much higher standard; that is, compared with any I ever saw; I never saw a great deal.

Q. 15. Did you examine the patched rails on the line of the Pittsburgh, Ft. Wayne & Chicago Railway Company, in 1862, or thereabouts?

1963 A. I did not in 1862. I did in 1864 and in 1861.

Q. 16. According to the best of your recollection, what should

you say was the average number of inches patched, per rail, when you saw them in 1864?

A. Taking both ends, I should think it would average 16 to 18 inches, but this is only recollection, it is not from absolute measurement.

Cross-examination by Mr. Roberts:

X Q. 1. Colonel, what book is that you have been reading from?

A. This is my pocket memorandum-book, for the year 1858.

X Q. 2. When were these statistics made up, Colonel?

A. Made up at the time, or about the time that they occurred.

X Q. 3. How does it come that the months of May and June are made up in a page in the diary in the month of March?

A. They were all put down together, and upon a blank page, prior to the date of the contract, so as not to interfere with other memoranda that I possibly might want to refer to by the dates.

X Q. 4. Did you attend, at the blacksmith-shop at Wooster, each evening on the dates given, to ascertain the work that had been done that day?

A. No, sir.

X Q. 5. How, then, did you get this data?

A. I got it from the report of Mr. Conley, my sub-contractor, to check with the report of the engineer of the road.

X Q. 6. Where is Mr. Conley now?

A. I haven't heard from him for many years.

1964 X Q. 7. What experience have you had as a practical blacksmith?

A. I have never done any work myself.

X Q. 8. What was your business in 1858, and where did you reside?

A. My business was that of a contractor, and resided in Alleghany.

X Q. 9. What was your business in 1864, and where reside?

A. Civil engineer and agent for railways, and resided in Alleghany.

X Q. 10. You speak of a contract with the company; was it in writing?

A. Yes, sir.

X Q. 11. Have you it with you?

A. I have not.

X Q. 12. Where is it?

A. I am under the impression that I gave it to Mr. Turrill.

X Q. 13. You, at one time, owned an interest in this patent, did you not?

A. Yes, sir.

X Q. 14. Are you still interested in the patent?

A. No, sir.

X Q. 15. How often did you pass over the line of the Fort Wayne Road in 1864?

A. A great many times; as often as twice a month.

X Q. 16. In what capacity?

A. In the capacity of an agent for the company.

X Q. 17. Agent for what?

A. For various purposes; I was purchasing some land for them; I was also seeing to the forwarding of some material for building. There were some other things that I cannot recollect the nature of altogether—the precise dates.

1965 X Q. 18. Had you anything to do with the ing of track, or keeping the road in repair?

A. No, sir.

X Q. 19. Mr. Williams, you said something in your direct examina-

tion about places for fires; were there more than two fires at Wooster, or places for more?

A. I don't recollect saying anything about places for fires in my direct examination.

X Q. 30. How many fires were there at Wooster at any time?

A. My impression is there were but two, but so long a time has elapsed I couldn't be positive.

X Q. 21. Could there have been more than two without your knowing it?

A. There could not without my knowing it at the time.

X Q. 22. What do you mean by that, Mr. Williams?

A. I mean that I was there every few days and saw all that was there.

X Q. 23. You refer to 1858, do you?

A. Yes, sir.

X Q. 24. Were you not engaged in business in Pittsburgh in 1858?

A. I made this my principal business; I was engaged in nothing else to take me away from attention to this; I directed a gas-works in that year for the company at Crestline; I was also agent for Cawood's swage-block and part owner; I was not in any other business than what I have stated.

X Q. 25. What work did you do for the Pennsylvania Railroad Company about that time?

A. The year following I furnished apparatus and lighted their cars with gas in the year '59 and '60. In the year 1858 (to be explicit) I furnished them with several estimates for work, but did no work for them.

DAVID H. WILLIAMS.

1966 NORTHERN DISTRICT OF ILLINOIS, *ss:*

I, William H. Bradley, clerk of the circuit court of the United States for the northern district of Illinois, do hereby certify the foregoing to be a full, true, and complete transcript of the record and proceedings of said court in the cause, wherein Samuel H. Turrill was the complainant and the Illinois Central Railroad Company, etc., was the defendant, as the same appears from the files in said cause, and the records of said court now remaining in my custody.

In testimony whereof, I have hereunto set my hand and affixed the seal of said court, at Chicago, this 17th day of September, A. D. 1874, and of our Independence the 99th year.

[SEAL.] W. H. BRADLEY, *Clerk.*

1967 SAMUEL H. TURRELL *v.* ILLINOIS CENTRAL R. R. CO. & OTHERS.

Opinions of the Hon. Thomas Drummond, circuit judge.

1968 TURRILL *vs.* ILLINOIS CENTRAL R. R. And in other cases, as per stipulation.

Circuit court northern district of Illinois.

Opinions of the court.

FIRST OPINION, JULY, 1871.

DRUMMOND, J.:

This controversy grows out of an alleged infringement by the defendants of a patent granted to Joseph D. Cawood on the 9th of Sep-

tember, 1856, for an improvement in the common anvil or swage-block, for the purpose of welding up and re-forming the ends of railroad-bars when they have become injured from unequal wear, and of which the plaintiff is the assignee. This patent has been before the Supreme Court of the United States, and has, to some extent at least, been construed, Turrill vs. Railroad Company, 1 Wallace, 491; in which case the specifications and claim are set forth. It has also been before this court. In this last case the law and facts were submitted to the court, and the patent was held valid, though attacked by the angle-iron machine, the bayonet-machine, and the Church machine. The court was then of the opinion that there was nothing in these old machines to prevent the operation of the patent of Cawood, as construed by the Supreme Court. It was admitted, in view of the previous machines, that the Cawood patent could not have a broad construction, but must be limited to such a movable press-block as was described, or its equivalent, in combination with such other block as was described, or its equivalent, united and operated as described, and for the pur-
1969 pose described. In order to understand this definition it is necessary to refer to the specifications. The movable press-block described is put upon and connected with various other parts of the machine. There is, first, a bed-sill of the proper size. Upon this is placed an anvil of cast iron. There is a raised solid block forming a part of the anvil, with its side shaped to the side of the rail which is to be placed in it; then upon the face of the anvil, and next to the raised block, with its side shaped as above, is put the movable press-block. It is attached to the anvil. It is worked by eccentric cams. It has its side next to the raised block shaped also to hold the rail; the latter thus has the raised block on one side, and the press-block on the other. This is the kind of press-block described, and this is the kind of other block described. It operates in this way: The piece of iron is prepared and heated; the rail is also heated in the fire, and is then swung round; the movable block brought against the rail, which is thus between the two, as in the jaws of a vise, and there firmly held, with the crown of the rail above and resting on the blocks until the welding or re-forming process is completed. The purpose effected is the reparation of the rail. Now it is clear that no true construction of this patent can be given without connecting the claim as made with the machine, and its purpose and mode of operation. Therefore, while it is essential that the various parts claimed should be constructed so as to accomplish the purpose, it is also essential that the parts claimed should be connected with parts not specifically mentioned in the claim; for example, with something to support the jaws of the vise, as well as the blows given in the act of reparation of the rail. It is clear, therefore, the jaws as described and constructed cannot be separated from other parts mentioned in the specifications. If they are, they cease to be such a movable press-block and such other block described, which are the blocks covered by the patent. It follows, therefore, that what gives support to the blocks is an essential part of the machine, and that it is not precisely correct to say that the only function of the Cawood machine is to hold the rail while being mended. That is only a part of its function. We must go further, and add it must be done substantially in the way described, and so as to accomplish the purpose mentioned. It was, therefore, supposed by the court, in the case of Turrill vs. The Illinois Central Railroad, viewing the machine as having its own peculiar form and mode of operation, that there was something in it which might be the subject of a patent, notwithstanding the angle-iron, bayonet, and

Church machines. A writ of error was taken out, and finally abandoned, and the judgment of this court affirmed. These questions have been re-argued in this case; but, under the circumstances, it could scarcely be expected that the opinion of the court would be changed. Cawood does
1970 not, in terms, in his claim, make the support to the jaws a part of his claim, but it necessarily follows, from the two things that he does claim in combination, in the manner described and set forth by him, that it is an essential part of the invention. One of the blocks is a raised part of the anvil; the other is attached to it and movable backward and forward so as to let in and firmly clasp the rail. If we were to remove the part beneath we should deprive the machine of one of its essential parts, and without which it would not be the machine described.

Some question has been made whether Cawood intended that the rail, in process of reparation, should rest as well upon the anvil as be clasped in the jaws of the blocks. There is nothing distinctly stated in the specifications to that effect, but there can be no doubt, I think, when fairly considering them in connection with the drawings, that such was supposed by him to be one of the incidents or results, and, perhaps, a necessary one, to the successful operation of the machine. It would seem that in this way the rail would be more solidly planted, and, therefore, better prepared to receive the blow given in the act of repairing. It is insisted, on the part of the defense, that for the rail to rest on the anvil in the work of reparation is a positive injury instead of a benefit, particularly in the case of what is called the fish rail. The argument is that if the rest of the rail on the anvil is an element of the Cawood patent, then, whenever that ceases to be the fact, there is no infringement. And it seems that in several machines used by some of the defendants, a part of the anvil has been chipped off beneath the rail, so that it no longer rests on the anvil. This, it is argued, deprives them of all that is new in the Cawood machine, and prevents them from being an infringement.

While I think the specifications treat the resting of the rail upon the anvil as a part of its mode of operation, I do not consider that one of the elements or indispensable parts of the machine, nor do I think, if enough of the anvil be removed to prevent the rail from resting on it, for that reason alone, it ceases to be the Cawood machine. And yet, it is clear, if the whole bottom support is removed, an essential part of the Cawood machine is gone, and there is nothing left, in effect, but a common vise. There might be instances between these two supposed cases where it would be difficult to determine whether the machine was a substantial equivalent of one of the old or of the Cawood machines. It would appear to be better, in order to accomplish the purpose Cawood had in view, that the rail should rest on the anvil; but it might not, and still it would possess in many respects the peculiar advantages of the Cawood machine; one of them, obviously, being the firmness of support given to the rail while in the act of being repaired. The
1971 fact that the machine, as intended by Cawood, has been used, and, by some of the defendants, several years, without special complaint, strengthens this view of the case. But even if what is added or taken away by the defendants is an improvement of the Cawood machine, it is still the machine, so long as its essential characteristics remain the same.

On the whole, then, there is nothing in this case to prevent the operation of the Cawood patent, when fairly construed, and therefore it will be held valid. The main argument has been upon the validity of the patent. I shall refer the case to a master, with directions to report

what machines used by the defendants infringe the patent of the Cawood machine, within the rules and principles here stated; also, what damages the plaintiff has sustained by such use. I adopt this practice in the present case for the reason that, while the rules laid down dispose of most of the questions which relate to infringement, there are others of some difficulty which I leave to be disposed of at the coming in of the master's report, upon exceptions or otherwise.

SECOND OPINION, JULY 26TH, 1873.

The exceptions made to the master's report in these cases are numerous, but they may all be considered under a few general heads.

The first seven exceptions refer to the fact that the master assumed that the patent had already been construed by the court, and that he declined to go into the general state of the art, in order to determine whether the defendants' machines infringed the patent, and also refused to consider the general scope and extent of the patent.

These exceptions must all be overruled.

The patent has been construed by the Supreme Court of the United States and by this court. The Supreme Court has declared the principles which were to govern in comparing the machine of the plaintiff with others alleged to be infringements; and this court, in the case of Turrill vs. The Illinois Central Railway, 3 Fisher's, 330, had decided the plaintiff's patent to be valid, and that certain machines used by the defendant violated the plaintiff's patent. In those cases in which the master has made his report, which are the subject of the exceptions, this court, in July, 1871, found that the plaintiff was entitled to the relief he asked against the infringements; that is, that the patent was valid, and that the defendants had infringed. It appeared that various expedients had been resorted to by some of the defendants in order to evade the patent. The court held that the anvil was an essential part of the machine to support the jaws while they held the rail in
1972 the act of reparation, but that the chipping out or removal of a portion of the anvil immediately beneath the rail, so as to prevent its contact with the anvil, did not of itself destroy the identity of the machine. At the same time it was conceded, if the anvil was so far cut off or removed as to cease to support the rail in receiving the blows of the hammer, an indispensable part of the machine was gone. It was because of the difficulty of ascertaining the extent to which the alteration had been made in all the machines used by the defendants, and because of the imperfect condition of the evidence as to one of the machines, that the court directed the master to report what machines used by the defendants infringed. It would have been, therefore, obviously out of place for the master to go into the general state of the art, either as to the construction of the patent or the infringement. All that he had to do was to decide as to the extent of the infringement, and as to the particular machines used by the defendants. And we say this without intending to deny the right of the master, in case the evidence before him presented the patent under any aspect not previously considered by the court, to report the facts for its instruction.

The eighth and ninth exceptions are that the master refused to receive or consider evidence tending to show that some of the defendants' machines are the same as some in use prior to the invention of the Cawood machine, and that he compared only the defendants' machines with Cawood's, in order to determine whether or not they infringed.

We think these two objections must also be overruled.

The principles upon which the validity of the patent for the Cawood machine was to be ascertained had already been decided by the court. The master had only to apply them to the Cawood and the other machines used by the defendants, a matter conceded to be not free from difficulty, mainly on account of the efforts made by defendants to evade the patent as they supposed it was, or ought to be, construed by the court.

As already stated, it was not the duty of the master to go through with the history of the machines offered in evidence in order to decide whether the defendants' machines infringed the plaintiff's. It was sufficient to compare them together to reach a conclusion on the subject. Any other rule would cause him to go over the ground already examined by the court.

The tenth, eleventh, twelfth, thirteenth, fourteenth, and fifteenth exceptions refer to the machines used by the defendants, and which, the master has reported, infringed the plaintiff's machine. These exceptions will be overruled. In some of the machines, it may be admitted, it is a question of some nicety, as in the Beebe & Smith's, the Bayonet vise, and the Michigan Southern. It is insisted that the master should not have reported these as infringing the Cawood machine, because, among other reasons, of the different construction of the jaws and the want of the anvil support. Stress is placed upon a remark of the court in the case of Turrill *vs.* The Illinois Central Railway, to the effect that when the jaws of a vise are cut to the shape of any instrument to be held, it would suggest the idea at once that they might be changed to the form of any other object or instrument. But this remark was made with regard to the Cawood machine in its finished state of treating the jaws as a vise. It was certainly a fact that the common anvil or swage-block had long been used for repairing rails, and, in comparing the old machine with the new, the difference in the operation, and in the time, expense, and labor, could not be lost sight of And, as connected with this, the anvil, as a support to the jaws while holding the rail in receiving the blows of the hammer, was considered. essential. Now, it is true, in some of these machines, the jaws are more elongated than in the Cawood machine, and in some the rail in the act of hammering does not actually come in contact with the anvil, or what takes the place of the anvil, but in all there is something more than a mere vise, and that seems borrowed from the Cawood machine. And, we think, in deciding on the question of infringement the conduct of the defendants in relation to their machines may be considered. There seems to have been a constant effort to approach as near as possible the plaintiff's machine, and yet not close enough to infringe. And, in overruling these objections, we think that while it may be true that the same rules should be applicable as in comparing the Cawood machine with other and prior machines to test the validity of the patent, yet that on the question of infringement the comparison should be made directly between the plaintiff's and the defendants' machines.

1973

The sixteenth exception will be sustained. That is made because the master found the Bain machine infringed the Cawood machine. We do not agree with the master in this. Cawood's patent does not include any machine by which a rail may be held in the act of reparation, but its own special method. Any other party was at liberty to devise a different method of holding the rail. This, we think, Bain has done by his machine. There are no jaws like those of the Cawood machine; there is no hammer used. The whole operation is performed by placing the rail between four rollers, two vertical, which sustain and press the rail, and two horizontal, one on each side, to hold it. It is a rolling process,

all the rollers moving as the rail advances or recedes in the act of
1974 reparation. The elemental idea of the Bain machine seems to us to be different from that of the plaintiff's machine. All the other machines found by the master to infringe may be said to be emanations or suggestions of the Cawood machine. This cannot be affirmed of the Bain machine. It is, as to this, an independent creation.

The seventeenth, eighteenth, nineteenth, twentieth, twenty-first, twenty-second, twenty-third, twenty-fourth, and twenty-fifth exceptions relate to the finding of the master that the old swage-block and the Cawood machine were the only two instruments by which the rail could be repaired, and that the comparison must be between them, and to the rejection of evidence that it was unprofitable to mend rails in the Cawood machine, and that it was better to reroll them or dispose of them in some other way. These exceptions will all be overruled.

We do not understand that up to the time of the invention and construction of the Cawood machine there was any other known method of repairing the rails than the common anvil or swage-block. The master reports that the only appliance previously used by the defendants was the common anvil or swage-block, and this statement is not controverted. If, then, the rails were repaired in the Cawood machine substantially in the same way, and the same result reached as when repaired on the common anvil, these were the only implements of comparison. As long as the defendants used the Cawood machine these were the only things that could be compared. It was competent always for the defendants at any time to make some other disposition of the damaged rails; to cut off the shattered ends, or reroll them, or sell them for old iron. As long as they mended them by the method of the Cawood machine it may be presumed that it was done because the interest of the defendants was thereby promoted; and it cannot be permitted to the defendants to show that they pursued a wrong policy and that they could have disposed of their rails much more profitably. This would strike at most of the patented devices of the time, they being constantly liable to be superseded by improvements, the progress in art, and the teachings of experience. Because it may have been that the use of rails mended in the common anvil or in the Cawood machine is attended with risk, the defendants could hardly be permitted to set off any possible damage they might sustain from breakage.

We think, therefore, that the master was correct in comparing the common anvil and the Cawood machine, and the cost of doing the work in them. And this brings up the objections made to the rule adopted by the master of estimating the profits of the defendants by the use of the plaintiff's machine. We admit that if at the time of their use there appeared to be any other methods of repairing the rails, then the
1975 damages of the plaintiff might be the difference between the least expensive of those methods and that of the plaintiff's machine, because that would be the advantage which the defendants derived by using the plaintiff's machine over any other appliance then open to them, and by which the rails could be mended equally well. But as we understand the rule laid down by the Supreme Court in Mowry vs. Whitney, 14 Wallace, 620, on the facts found by the master, his rule of profits was correct.

The twenty-sixth, twenty-seventh, twenty-eighth, twenty-ninth, and thirtieth exceptions relate to omissions of the master to find the difference in the cost of the machines and of their use. We think that these may be proper elements to enter into the amount of profits in using the different machines; but the exceptions fail to point out wherein the

master has erred, and the counsel have not, in the argument, directed our attention to the evidence which establishes the error of the master in this respect, nor has the evidence been brought before us. We do not therefore judicially know the cost of the various machines reported by the master to infringe, nor the expense of using them. We think, in order that these exceptions should be available to the defendants, the evidence showing the error of the master should be specifically pointed out, at least in the argument. That has not been done, and therefore they will be overruled. And we may add that, so far as we can judge from an inspection of the machines, with the exception of the Bain machine, the difference in the cost of the infringing machine as compared with the Cawood machine could not be very great.

The exception which is special on the part of the Chicago and Fort Wayne Railway Company is, we think, well taken, and must be sustained. In view of the history of this company and the legislation affecting it, the master ought to have found how far and to what extent the old company and the new infringed, and if there was a difference a discrimination should have been made; the more so as the new company may not be responsible for the debts of its predecessor.

It is objected in the argument that the master has not drawn correct conclusions from the evidence as to the cost of labor and fuel in mending the rail on the anvil and in the Cawood machine. The evidence proving the error of the master has not been pointed out to us, and it would be necessary to examine critically the whole of the testimony in this branch of the case in order to determine—something we could hardly be expected to do on such a general objection as this; but as the case will have to be put back to the master, he can be directed to examine the evidence and correct any conclusions he has made, if he thinks the evidence justifies it.

1976 NORTHERN DISTRICT OF ILLINOIS, *ss:*

I, William H. Bradley, clerk of the circuit court of the United States for the northern district of Illinois, do hereby certify the foregoing to be correct copies of the opinions delivered by the Hon. Thomas Drummond, circuit judge, at the dates respectively, in the several case, wherein Samuel H. Turrill was plaintiff, the Illinois Central R. R. Co. and others defendants, as the same appears from the files of said court in said cases.

In testimony whereof I have hereunto set my hand and affixed the seal of said court this 7th day of October, 1874.

[SEAL.] W. H. BRADLEY, *Clerk.*

(Indorsement on cover:) No. 140. The Illinois Central Railroad Company, appellant, vs. Samuel H. Turrill. [N. Illinois C. C. U. S. Filed 14th October, 1874.